November 1997

Dear Reader:

This Draft EIS/EIR has been jointly prepared by the Bureau of Land Management, as lead agency under the National Environmental Policy Act (NEPA), and Imperial County, as lead agency under the California Environmental Quality Act (CEQA).

The Imperial Project is a proposal by Glamis Imperial Corporation to develop an open-pit, precious metal mining operation utilizing heap leach processes located on public lands administered by the U.S. Bureau of Land Management, El Centro Resource Area Office, of the California Desert District. It would consist of three open pits, two waste rock stockpiles, two soil stockpiles, five ephemeral wash diversion channels, an administration office and maintenance facility area, a heap leach facility, a precious metal recovery plant, an electric substation, and internal roads and associated electrical distribution lines. Up to four ground water production wells and 3.7 miles of buried water pipeline and new 92 kV/13.2 kV electrical transmission line would be built adjacent to Indian Pass Road, which would be relocated in two locations. As part of the Proposed Action, the Imperial Irrigation District would also overbuild approximately 16 miles of existing 34.5 kV electric transmission line into a 92 kV/34.5 kV electric transmission line to provide electrical power for the Project. The Proposed Action would create a total of 1,362 acres of disturbance.

This Draft EIS/EIR has been revised from, and either replaces, pursuant to NEPA, or is a recirculation of, pursuant to CEQA, the previous Draft EIS/EIR, dated November 1996, for the Imperial Project. Since November, 1996, substantial revisions have been made in the Proposed Action by Glamis Imperial; additional environmental field data has been collected under the direction of the lead agencies; and additional analyses and assessments of the environmental effects of the Proposed Action have been conducted. Comments submitted on the November 1996 Draft EIS/EIR were treated as scoping comments for this Draft EIS/EIR, and will remain part of the administrative record. **However, the lead agencies will not provide a written response to these previous comments, and will only respond to comments submitted in direct response to this Draft EIS/EIR.** Copies of Volume I of this Draft EIS/EIR have been sent to every agency, person, and organization that commented directly on the November 1996 Draft EIS/EIR or provided scoping comments for this Draft EIS/EIR. Copies of the technical reports prepared for the project which have been used in the preparation of this Draft EIS/EIR are contained in Volume II of this Draft EIS/EIR and are available for review at the libraries listed herein, the Imperial County Planning/Building Department, and Bureau of Land Management office in El Centro, California. A limited number of copies of Volume II of this Draft EIS/EIR are available through the Bureau of Land Management, El Centro Resource Area.

Comments concerning this Draft EIS/EIR are welcome and will be considered in the preparation of the Final EIS/EIR. A 60-day public review period has been established. **To be considered, written comments on this document must be received by 4:30 pm on January 27, 1998 at the following address:**

Bureau of Land Management
1661 South 4th Street
El Centro, California 92243
Attention: Douglas Romoli
(909) 697-5237

Public hearings on the Draft EIS/EIR have also been scheduled by the BLM:

	Holtville, California Barbara Worth Golf Resort 2050 Country Club Drive Holtville, CA 92250	La Mesa, California Comfort Inn 8000 Parkway Drive La Mesa, CA
Date:	December 11, 1997	December 10, 1997
Time:	7:00 pm	7:00 pm

Respectfully submitted,

Terry R. Reed
Area Manager
El Centro Resource Area

Jurg Heuberger, AICP
Planning Director
County of Imperial

LIST OF LIBRARIES WHICH HAVE BEEN SENT COPIES OF THE DRAFT EIS/EIR

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San Diego, CA 92139-3137

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3820 Ray Street
San Diego, CA 92104-3623

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El Centro, CA 92243

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380 East Aten Road
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101 East Sixth Street
Holtville, CA 92250

Yuma County Library District
350 South 3rd Avenue
Yuma, AZ 85364

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San Diego, CA 92105-4941

San Diego City Public Library - Logan Hills
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San Diego, CA 92113-2498

IMPERIAL PROJECT
IMPERIAL COUNTY, CALIFORNIA

DRAFT
ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENTAL IMPACT REPORT

VOLUME I
(including Appendix A)

State Clearinghouse No. 95041025

NOVEMBER 1997

Applicant

Glamis Imperial Corporation

Prepared By:

U.S. Department of the Interior
Bureau of Land Management

Tim Salt
District Manager, Acting
California Desert District

County of Imperial
Planning/Building Department

Jurg Heuberger, AICP
Planning Director
County of Imperial

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Imperial Project, Imperial County, California
Bureau of Land Management Plan of Operations Approval and Right-of-Way Approval
Imperial County Conditional Use Permit and Reclamation Plan Approval
Draft Environmental Impact Statement/Environmental Impact Report

Lead Agencies:

U.S. Department of the Interior
Bureau of Land Management
California Desert District
El Centro Resource Area
El Centro, California

County of Imperial
Planning/Building Department
El Centro, California

Prepared By:

Environmental Management Associates, Inc.

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John L. Morrison, Asst. Planning Director
Imperial County Planning/Building Dept.
939 Main Street
El Centro, California 92243
(760) 339-4236

Abstract:

This Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) for the Imperial Project has been revised from, and either replaces, pursuant to NEPA, or is a recirculation of, pursuant to CEQA, the November 1, 1996 Draft EIS/EIR for the Imperial Project. Since November, 1996, substantial revisions have been made in the Proposed Action by the Applicant; additional environmental field data collected under the direction of the Lead Agencies, and additional analyses and assessments of the environmental effects of the Proposed Action conducted.

The Imperial Project (Project) is a proposal by Glamis Imperial Corporation to develop an open-pit, precious metal mining operation utilizing heap leach processes. The Project area, which is located entirely on public lands administered by the U.S. Bureau of Land Management (BLM), El Centro Resource Area Office, of the California Desert District, is located in eastern Imperial County, California, approximately 45 miles northeast of El Centro, California and 20 miles northwest of Yuma, Arizona, northeast of Ogilby Road along Indian Pass Road.

The Project area consists of a Project mine and process area and a Project ancillary area. The Project mine and process area, which is comprised of approximately 1,571 acres of unpatented mining claims, would contain all of the open pits, waste rock stockpiles, soil stockpiles, ephemeral wash diversion channels, administration office and maintenance facility area, heap leach facility, precious metal recovery plant, an electric substation, and internal roads and electrical distribution lines. The Project ancillary area would include ground water production wells, a buried water pipeline, and a

new 92 kV/13.2 kV electrical transmission line, all located adjacent to Indian Pass Road, and two (2) relocated portions of Indian Pass Road. In addition, the Imperial Irrigation District would overbuild an existing 34.5 kV electric transmission line into a 92 kV/34.5 kV electric transmission line to provide electrical power for the Project. Together, these activities constitute the Proposed Action.

Up to 150 million tons of ore would be mined and leached, and 300 million tons of waste rock mined and deposited at the proposed waste rock stockpiles or the mined-out portions of the three (3) open pits. The daily mining rate would typically be 130,000 tons per day, and range between zero (0) and 200,000 tons per day. Approximately 1,362 acres of surface disturbance would occur as a result of the Proposed Action, which includes 1,302 acres within the Project mine and process area, 38 acres within the Project ancillary area, and 22 acres from the overbuilding of the existing 34.5 kV electric transmission line. Project operations within the Project area would be performed up to 24 hours per day, seven (7) days per week. Project operations are projected to commence in 1998, after the acquisition of all required approvals, and terminate around the year 2017, although final reclamation activities may continue beyond this date.

The Proposed Action incorporates measures to reduce the level and significance of impacts to the human environment. However, even with the application of additional proposed mitigation measures, mine construction, operations, facilities and conditions would result in significant adverse effects to prehistoric cultural resources, Native American traditional cultural uses and values, and visual resources.

The Proposed Action would generate up to 120 local job opportunities, and would require approximately $48 million in initial capital expenditures, $1.7 million per year in continuing capital expenditures, and $26 million per year in non-capital expenditures including payroll. In addition, the Project would pay sales tax on expenditures and pay local property taxes on mine assets. These would be beneficial economic effects of the Proposed Action.

Alternatives to the Proposed Action which are analyzed in this EIS/EIR include:

- West Pit Alternative;
- East Pit Alternative;
- Complete Pit Backfill Alternative; and
- No Action Alternative.

Federal, State, and Local Agency Authorizing Actions Required for the Imperial Project

Approval of Plan of Operations, including the Reclamation Plan, for mine and process operations from BLM;
Right-of-Way approval for relocation of Indian Pass Road from BLM;
Right-of-Way approval for new and overbuilt transmission lines from BLM;
Biological Opinion from the U.S. Fish and Wildlife Service as a result of formal consultation with the BLM in conformance with Section 7 of the federal Endangered Species Act;
Individual Clean Water Act Section 404 Permit from the U.S. Army Corps of Engineers;
User of High Explosives Permit from the Bureau of Alcohol, Tobacco and Firearms;
Explosives Permit from the Imperial County Sheriff;
Waste Discharge Requirements for discharge of wastes to land from the California Regional Water Quality Control Board, Colorado River Basin Region;

Certification of Compliance with Section 401 of the federal Clean Water Act from the California Regional Water Quality Control Board, Colorado River Basin Region;

California Endangered Species Act (California Fish and Game Code Section 2081) Management Permit from the California Department of Fish and Game;

Stream or Lake Alteration Agreement (California Fish and Game Code Section 1603) from the California Department of Fish and Game;

Concurrence from the California State Office of Historic Preservation as a result of consultation with the BLM in conformance with Section 106 of the National Historic Preservation Act;

Conditional Use Permit through the Imperial County Planning/Building Department for drilling ground water production wells;

Reclamation Plan approval through the Imperial County Planning/Building Department for Project facilities;

Building Permits and Certificate of Occupancy from the Imperial County Planning/Building Department;

Individual Septic Disposal System Permit from the Imperial County Department of Health Services;

Authority to Construct applicable air pollution emission units from the Imperial County Air Pollution Control District;

Permit to Operate applicable air pollution emission units from the Imperial County Air Pollution Control District;

Ground Water Extraction Permit from the Imperial County Public Works Department;

Encroachment Permit from the Imperial County Department of Public Works and Road Revocation from the Imperial County Board of Supervisors for Project access off, and relocation of, Indian Pass Road; and

Plan Review by the Imperial County Fire Department for conformance with Uniform Fire Code.

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SUMMARY

IMPERIAL PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT/
ENVIRONMENTAL IMPACT REPORT

VOLUME I

SUMMARY

PURPOSE OF THIS DOCUMENT

This Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) has been jointly prepared by the U.S. Bureau of Land Management (BLM), which is the Lead Agency with respect to compliance with the National Environmental Policy Act (NEPA) and its implementing regulations, and the Imperial County Planning/Building Department (ICPBD), which is the Lead Agency responsible for compliance with the California Environmental Quality Act (CEQA) and its applicable regulations, to analyze the environmental effects of the Proposed Action, which consists of the Imperial Project, an open-pit, heap-leach, precious metal mine proposed by Glamis Imperial Corporation, and the "overbuilding" of an existing utility electrical transmission line to deliver the necessary electrical power to the Imperial Project.

This Draft EIS/EIR has been revised from, and either replaces, pursuant to NEPA, or is a recirculation of, pursuant to CEQA, the November 1, 1996 Draft EIS/EIR for the Imperial Project. Since November, 1996, substantial revisions have been made in the Proposed Action by the Applicant. Additional environmental field data have also been collected under the direction of the Lead Agencies, and additional analyses and assessments of the environmental effects of the Proposed Action have been conducted.

The purpose of this joint EIS/EIR is to inform decision-makers in all agencies required to approve authorizing actions and the public generally regarding: the anticipated significant environmental effects of the Proposed Action; the possible ways to mitigate these significant effects of the Proposed Action; and reasonable alternatives which could feasibly reduce those identified significant environmental impacts of the Proposed Action to below the level of significance. The information in an EIS or EIR does not control an agency's discretion on a project. However, under CEQA, the state or local agency must adopt feasible mitigation measures or alternatives within its jurisdiction if they would avoid significant environmental effects identified for the Proposed Action. This EIS/EIR also provides, in Table S.1, the identified areas of controversy and the issues to be resolved.

This Draft EIS/EIR has been prepared as two (2) separate volumes, which together comprise the entire document. Volume I contains the Summary, the Table of Contents, Chapters 1 through 11, and Appendix A of the Draft EIS/EIR, the Imperial Project Reclamation Plan (including several attachments to the Reclamation Plan). Volume II contains Appendices B through O of the Draft EIS/EIR. Both Volumes of this Draft EIS/EIR are available for public review at the BLM's El Centro Resource Area Office, the Imperial County Planning/Building Department, and the libraries listed in the front of this volume of the Draft EIS/EIR.

PROPOSED ACTION

Glamis Imperial Corporation (Glamis Imperial) has proposed the development of the Imperial Project (Project), an open-pit, heap-leach, precious metal mine and processing facility located in eastern Imperial County, California, approximately 45 miles northeast of El Centro, California and 20 miles northwest of Yuma, Arizona (Figure S.1). The Project mine and associated processing facilities would be constructed on unpatented mining claims located on public lands administered by the U.S. Bureau of Land Management (BLM), El Centro Resource Area Office, of the California Desert District, which are located within portions of Sections 31, 32 and 33, Township 13 South, Range 21 East, and Sections 4, 5, 6, 7, and 8, Township 14 South, Range 21 East, San Bernardino Baseline & Meridian (SBB&M) (Figure S.2). The Project would be located south of State Route 78 and north of Interstate Highway 8, and would be accessed via Ogilby Road, a secondary paved road, and Indian Pass Road, a County-maintained dirt road. Some light-weight vehicles could occasionally access the Project area via BLM Route A278, Hyduke Road.

The Project area consists of a Project mine and process area and a Project ancillary area. The 1,571-acre Project mine and process area would be completely fenced and contain three (3) open pits, two (2) waste rock stockpiles, two (2) soil stockpiles, five (5) drainage diversion channels, an administration office and maintenance shop facility area, a heap leach facility (consisting of a heap leach pad and process ponds), a precious metal recovery plant, an electric substation and emergency generator, and internal haul and maintenance roads and electrical distribution lines. These facilities would result in approximately 1,302 acres of surface disturbance (Figure S.3).

The Project ancillary area (Figure S.2) would include up to four (4) ground water production wells, a buried water pipeline, a new 92 kV/13.2 kV transmission line, and relocated portions of Indian Pass Road; these facilities, of which only the water wells would be fenced, would result in approximately 38-acres of surface disturbance.

The Proposed Action would consist of the Project activities described above, together with the overbuilding of an existing 34.5 kV utility electric transmission line, which is necessary to transmit the electrical energy necessary for the Project. The existing 34.5 kV transmission line would be overbuilt with a 92 kV transmission line in an area called the overbuilt 92 kV/34.5 kV transmission line corridor. This overbuilt 92 kV/34.5 kV transmission line corridor begins immediately south of Interstate Highway 8 at Sidewinder Road, and continues approximately sixteen (16) miles to its intersection with Indian Pass Road (Figure S.2). Overbuilding the existing 34.5 kV electric transmission line would result in approximately 22 acres of surface disturbance

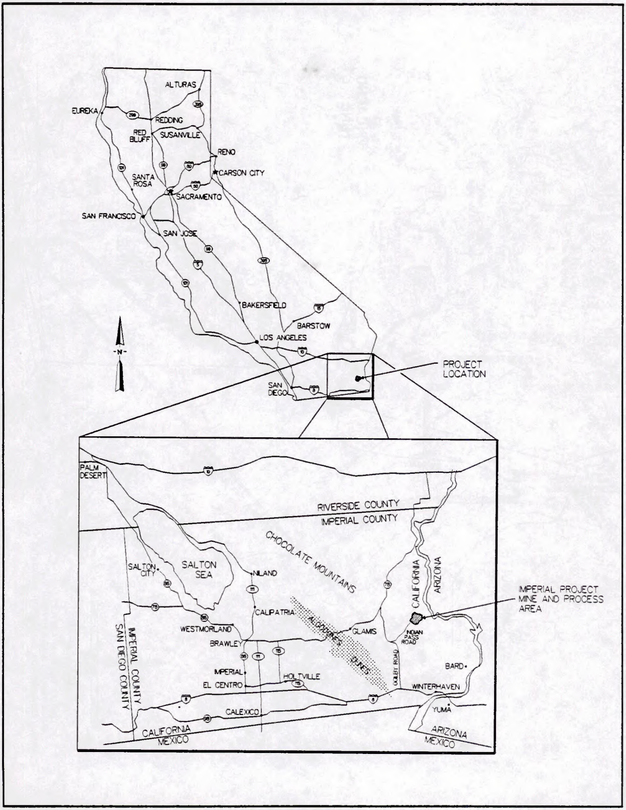

Figure S.1: Imperial Project General Location Map

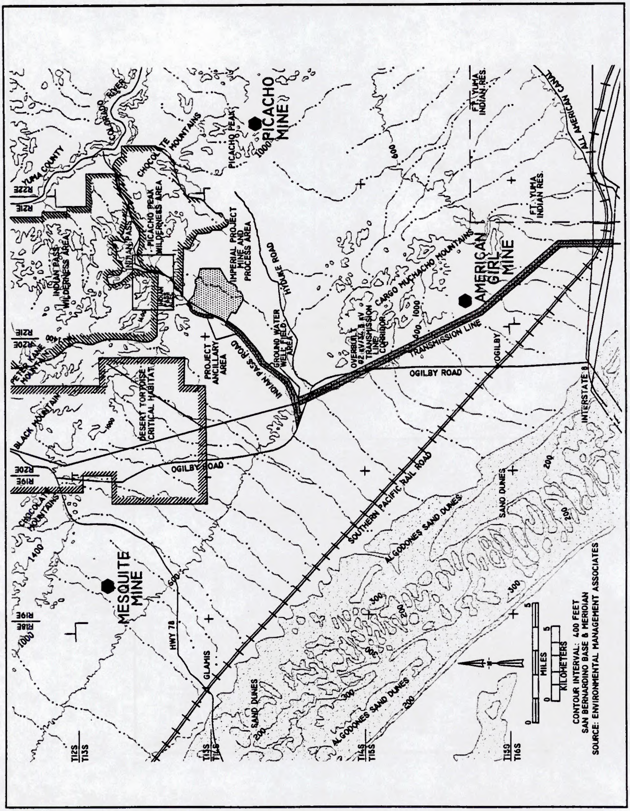

Figure S.2: Imperial Project Vicinity Map

Up to 150 million tons of ore would be mined and deposited on the leach pad where the precious metals would be leached. Up to 300 million tons of waste rock would be mined and deposited in the waste rock stockpiles or the mined-out portions of two (2) of the open pits. Mining activities would be performed 24 hours per day, seven (7) days per week. The daily mining rate would typically be 130,000 tons per day, and range between zero (0) and 200,000 tons per day. The mine would commence operation in 1998, after the acquisition of all required approvals. Operations would terminate in approximately the year 2017, although reclamation activities may continue beyond that date.

Mining of the three (3) pits would be phased, and would each include drilling, blasting, loading and hauling. Ore would be hauled, without crushing, to the heap leach pad to be leached of the precious metals with a dilute process solution containing sodium cyanide. The heap leach pad would be lined with synthetic materials as an engineered, zero-discharge facility with leak detection systems, in conformance with the requirements of the California Regional Water Quality Control Board, Colorado River Basin Region. The leached precious metals would be recovered from the dilute cyanide process solution in the process plant, and shipped off-site as gold doré for further processing. Waste rock would be placed on either the two (2) waste rock stockpiles, located adjacent to the pits, or into one (1) of two (2) of the previously mined-out open pits. The West Pit would be the first pit mined, followed by the Singer Pit, followed by the East Pit (Figure S.3); both the West Pit and the Singer Pit and would be entirely backfilled with waste rock under the Proposed Action.

Up to four (4) ground water production wells would be drilled and completed to provide the Project average water requirements of approximately 1,200 acre feet per year (afy). These wells would be drilled in a 1.5-mile section of the Project ancillary area known as the ground water well field area (Figure S.2). The produced ground water would be pumped to the Project mine and process area via a buried pipeline.

Peak Project electrical power demand of up to eight (8) MW would be provided from the utility grid. This would require the overbuilding of an existing Imperial Irrigation District (IID) 34.5 kV transmission line for approximately sixteen (16) miles from Interstate Highway 8 near Sidewinder Road to Indian Pass Road near Ogilby Road (Figure S.2), to create an overbuilt 92 kV/34.5 kV transmission line, also owned by the IID. At that point, the IID would construct a new 92 kV transmission line, within the Project ancillary area adjacent to Indian Pass Road, for approximately 3.7 miles to a mine substation built within the Project mine and process area. A new 13.2 kV distribution line would also be underbuilt on the same transmission line poles as the new 92 kV transmission line from the Project mine and process area to provide power to the Project ground water well pumps located in the ground water well field area along Indian Pass Road. A 750 kW± diesel-powered emergency electric generator would be located in the Project mine and process area.

An approximately 6,000-foot section of Indian Pass Road would be realigned approximately 1,000 feet to the west of the Project mine and process area to allow for the safe passage of traffic during the mining of the West Pit (Figure S.3), and the intersection of Indian Pass Road with Ogilby Road would be slightly realigned. The relocated portion of Indian Pass Road would be returned to

approximately its original location once the West Pit had been backfilled. Several ephemeral drainage channels located within the Project mine and process area would be permanently diverted around Project pits within the Project mine and process area (Figure S.3), although all diversions would return the diverted water to the same major ephemeral drainage system, still within the Project mine and process area.

As many as 300 workers may be required to construct the Project facilities, although only a small number of these workers would be working on the Project or the overbuilt 92 kV/34.5 kV transmission line at any given time. Approximately 120 full-time workers would be employed to operate the Project, most working in shifts (about 64 would work on any given day). Project traffic on Ogilby Road and Indian Pass Road is estimated at approximately 47 light-weight vehicle round trips, and 3.5 heavy truck round trips, per day. The Project would spend approximately $48 million for initial capital items, $1.7 million per year in continuing capital expenditures, and spend $26 million per year in non-capital expenditures including payroll. The Project would pay sales taxes on expenditures and pay local property taxes on the assessed valuation of the resources and assets.

Reclamation activities would be conducted by Glamis Imperial in accordance with the California Surface Mining and Reclamation Act of 1975 (SMARA) and the federal regulations found at 43 CFR 3809.1-3(d) and 14 CCR 3500. The proposed Reclamation Plan includes measures for: protecting wildlife and the public; minimizing erosion and mass failure potential; demolishing and removing structures; neutralizing process components; regrading the waste rock stockpiles and heap; revegetating areas of surface disturbance; and, where feasible, providing for the resumption of pre-mining land uses. Figure S.4 shows the projected final contours of the principal features within the Project mine and process area (South Waste Rock Stockpile, East Waste Rock Stockpile, heap, backfilled West Pit and Singer Pit, and open East Pit) after the completion of final reclamation.

Glamis Imperial Corporation, a Nevada Corporation, is a wholly owned subsidiary of Glamis Gold, Inc., also a Nevada Corporation. Glamis Gold, Inc. is a wholly owned subsidiary of Glamis Gold Ltd., a corporation incorporated under the laws of the Province of British Columbia, Canada, which is a publicly traded company on the New York and Toronto Stock Exchanges. Glamis Imperial Corporation has two (2) sister companies operating gold mines in the United States. They are Chemgold, Inc., which operates the Picacho Mine in Imperial County, California, and Rand Mining Company, which operates the Rand Mine in Kern County, California.

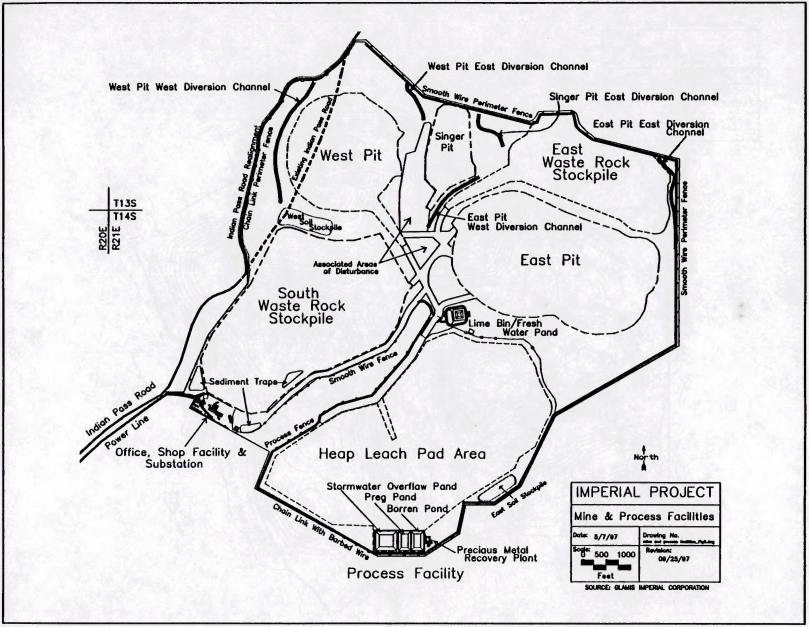

Figure S.3: Imperial Project Mine and Process Area Facilities

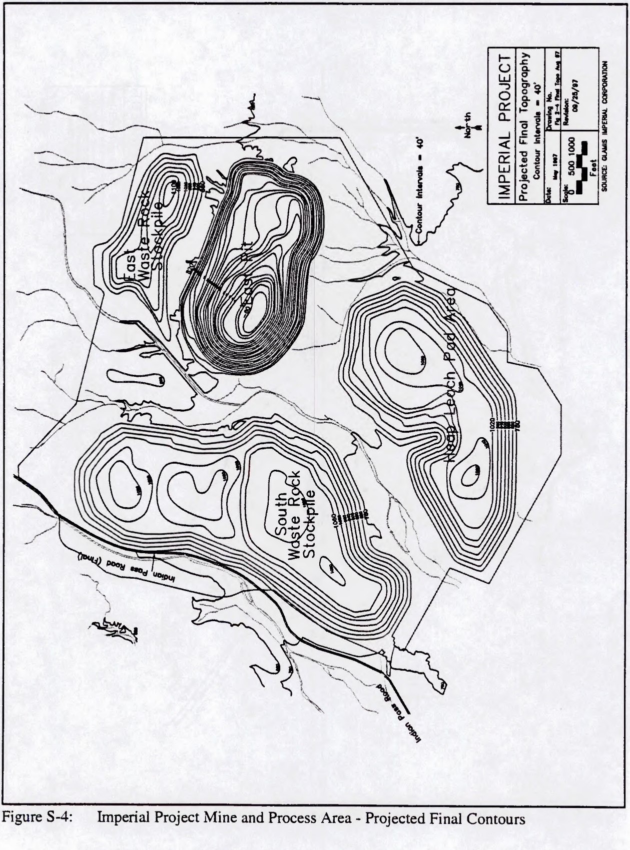

Figure S-4: Imperial Project Mine and Process Area - Projected Final Contours

WEST PIT ALTERNATIVE

The West Pit Alternative would mine only the West Pit and the Singer Pit, and would produce an estimated 150 million tons of mined material. The West Pit Alternative would eliminate the East Pit, the East Waste Rock Stockpile, and the East Pit West and East Pit East drainage diversions within the Project mine and process area. In addition, the size of the leach pad, the process area, and the haul and maintenance roads would also be reduced from those within the Project mine and process area, and no more than two (2) ground water production wells would be required. All of the other components of the Proposed Action would still be required and would be constructed and operated as under the Proposed Action. Figure S.5 provides a general layout of the facilities within the West Pit Alternative project mine and process area. The total area of surface disturbance within the West Pit Alternative project mine and process area would be 795 acres, reduced from the 1,302 acres disturbed under the Proposed Action. Surface disturbance within the Project ancillary area would be reduced from 38 acres to 36 acres, and surface disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor would be unchanged at 22 acres.

Only a small portion of the West Pit would be backfilled with waste rock from mining of the Singer Pit, and the Singer Pit would not be backfilled, since the East Pit would not be mined under the West Pit Alternative (see Figure S.6). Both the South Waste Rock Stockpile and the heap would be constructed to approximately the same height as under the Proposed Action.

Mining and processing rates for the West Pit Alternative are assumed to be the same as those for the Proposed Action, and initial capital costs, and ongoing capital and operating costs, would also be similar. However, Project life for the West Pit Alternative would be approximately ten (10) years, reduced from the approximately twenty (20) years under the Proposed Action, although final reclamation may continue beyond ten (10) years.

Following the completion of mining, the West Pit Alternative assumes that all of the same reclamation methods which are to be applied for the Proposed Action would be undertaken and completed for the West Pit Alternative. Indian Pass Road would be returned to a location east of and approximately parallel to the diverted West Pit West Diversion channel, and the assessment of the probability of the formation of a pit lake after mining would also be conducted on the West Pit after the completion of mining.

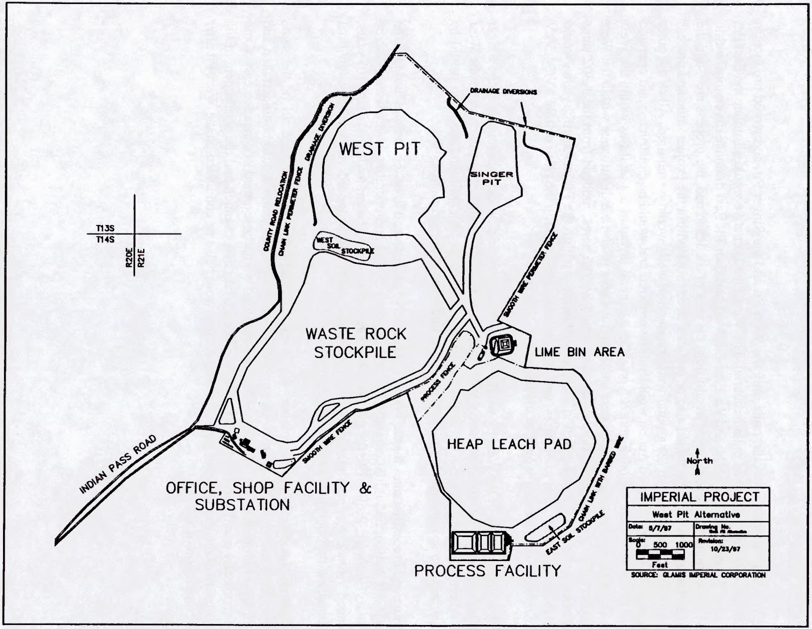

Figure S-5: West Pit Alternative - Mine and Process Area Facility Details

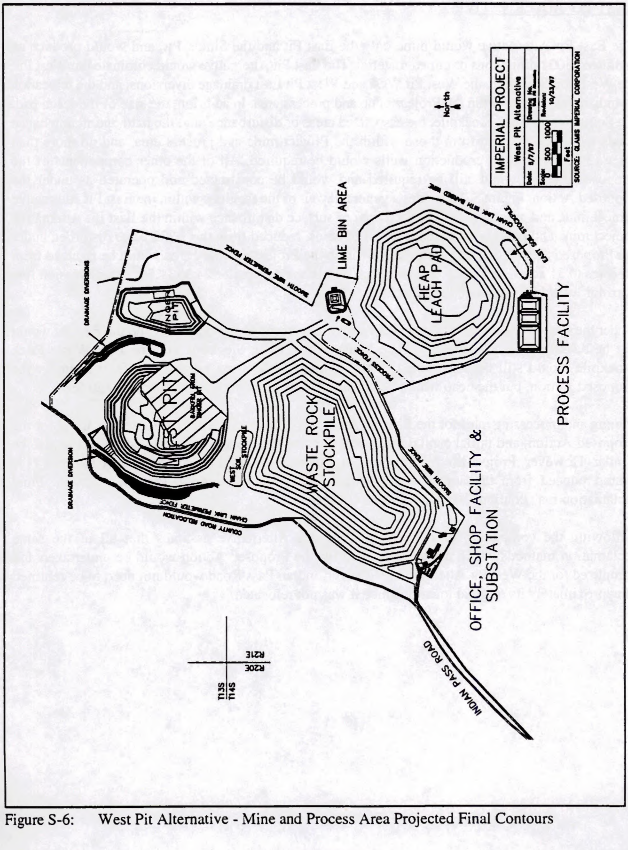

Figure S-6: West Pit Alternative - Mine and Process Area Projected Final Contours

EAST PIT ALTERNATIVE

The East Pit Alternative would mine only the East Pit and the Singer Pit, and would produce an estimated 300 million tons of mined material. The East Pit Alternative would eliminate the West Pit, the West Soil Stockpile, the West Pit West and West Pit East drainage diversions, and the relocation of Indian Pass Road within the Project mine and process area. In addition, the size of the leach pad, the South Waste Rock Stockpile, the associated areas of disturbance, and the haul and maintenance roads would be reduced from those within the Project mine and process area, and no more than three (3) ground water production wells would be required. All of the other components of the Proposed Action would still be required and would be constructed and operated as under the Proposed Action. Figure S.7 provides a general layout of the facilities within the East Pit Alternative project mine and process area. The total area of surface disturbance within the East Pit Alternative project mine and process area would be 1,126 acres, reduced from the 1,302 acres disturbed under the Proposed Action. Surface disturbance within the Project ancillary area would be reduced from 38 acres to 31 acres, and surface disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor would be unchanged at 22 acres.

Under the East Pit Alternative, the Singer Pit would be completely backfilled, and the East Pit would not be backfilled (see Figure S.8). The South Waste Rock Stockpile and the East Waste Rock Stockpile would still be constructed to approximately the same height (300 feet) as under the Proposed Action, but the heap would be constructed to a height of approximately 250 feet.

Mining and processing rates for the East Pit Alternative are assumed to be the same as those for the Proposed Action, and initial capital costs, and ongoing capital and operating costs, would also be similar. However, Project life for the East Pit Alternative would be approximately fourteen (14) years, reduced from the approximately twenty (20) years under the Proposed Action. Final reclamation may continue beyond fourteen (14) years.

Following the completion of mining, the East Pit Alternative assumes that all of the same reclamation methods which are to be applied for the Proposed Action would be undertaken and completed for the West Pit Alternative. However, Indian Pass Road would not need to be returned to approximately its original location since it was not relocated.

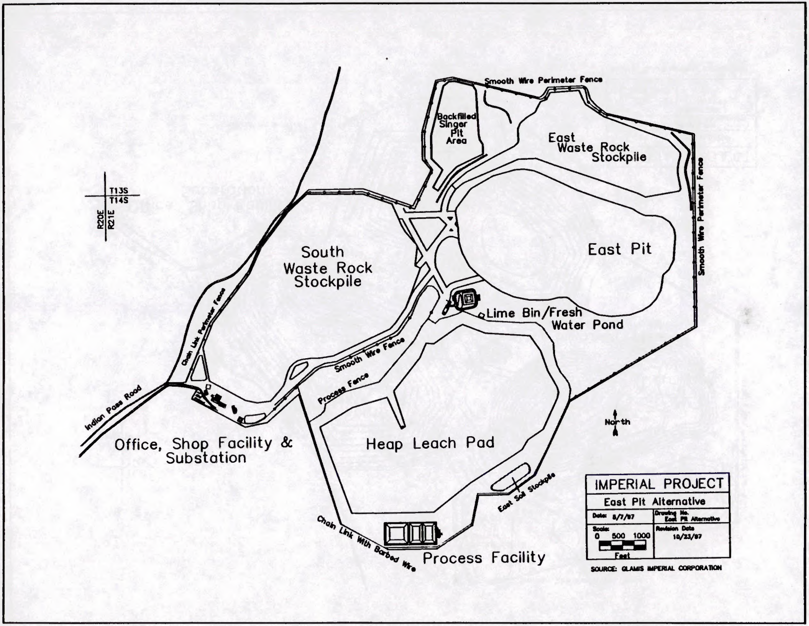

Figure S-7: East Pit Alternative - Mine and Process Area Facility Details

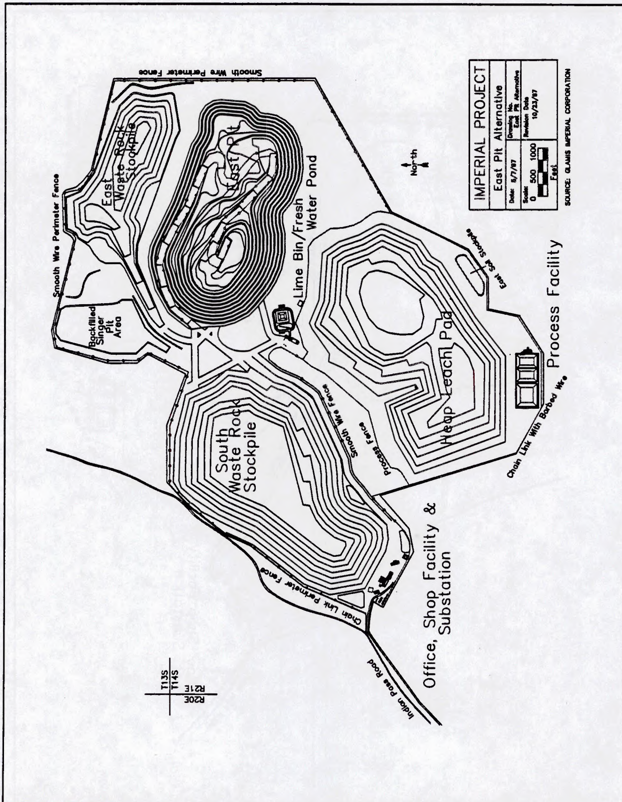

Figure S-8: East Pit Alternative - Mine and Process Area Projected Final Contours

COMPLETE PIT BACKFILL ALTERNATIVE

The Complete Pit Backfill Alternative consists of the complete filling of all of the open pits with mined material to at least original grade. After the completion of mining (as described under the Proposed Action), waste rock would be loaded back into the haul trucks, which would be driven to the edge of the open East Pit and the waste rock dumped into the pit. It would require up to approximately 4.33 years (4 years, 4 months) to move enough waste rock back into the open East Pit to fill it to grade once mining was complete, and cost up to approximately $100 million.

Because broken rock occupies a greater volume than the same volume of solid rock, all of the rock mined from an open pit would not fit back into that same pit. All of waste rock would backfill all of the pits, and the spent leached ore would remain where originally placed. The Complete Pit Backfill Alternative would not result in any reduction of surface disturbance compared to the Proposed Action since the Complete Pit Backfill Alternative includes completion of the Proposed Action. However, all of the surface area disturbed by waste rock stockpiles and the East Pit would be reclaimed "at grade," and not reclaimed as a stockpile or pit, since the waste rock contents of the stockpile would have been removed and dumped into the open pits (see Figure S.9).

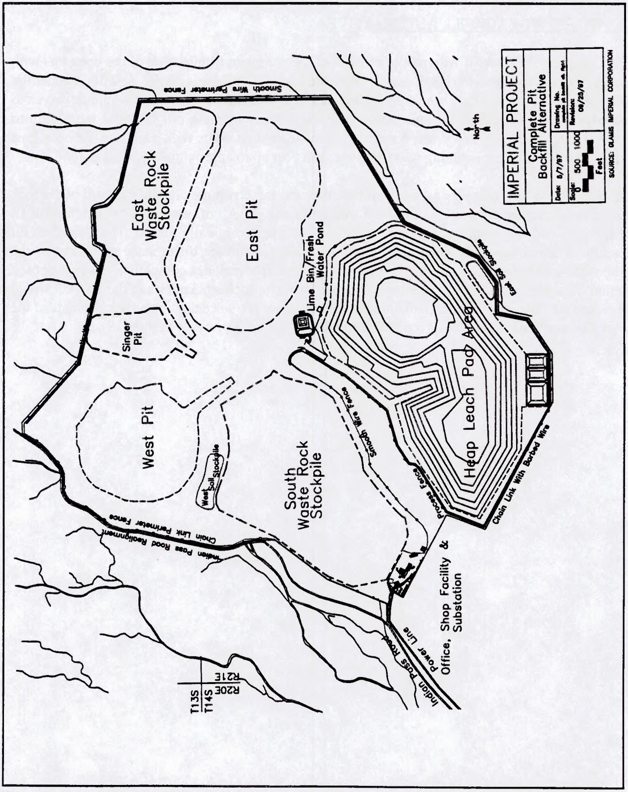

Figure S-9: Complete Pit Backfill Alternative - Mine and Process Area Projected Final Contours

NO ACTION ALTERNATIVE

If the No Action (no project) Alternative is implemented, the Project area would remain as is, and present uses in the area, including opportunities for dispersed recreational activities, would continue. The Project area would remain available for future commercial gold processing proposals or for other proposals as permitted by BLM policy or land use designations.

ENVIRONMENTAL CONSEQUENCES, MITIGATION MEASURES, AND SIGNIFICANCE

The environmental consequences of, mitigation measures for, and level of significance of the environmental consequences before and after mitigation for the Proposed Action and each Alternative identified in this EIS/EIR are summarized in Table S.1. Detailed discussions of the environmental consequences of, mitigation measures for, and significance before and after mitigation of, the Proposed Action and each of the Alternatives, are provided in Chapter 4 of this EIS/EIR.

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	GEOLOGY AND MINERAL RESOURCES
Issue:	Slope stability and seismic effects
Measures Incorporated by Project Design or Regulation:	▸ 4.1.1-1: Heap leach pad and waste rock stockpile slopes shall be constructed at overall slopes no steeper than 2H:1V. ▸ 4.1.1-2: Mine pit slopes shall be constructed at overall slopes no steeper than 1H:1.2V (50 degrees) unless mining conditions and geotechnical factors demonstrate through engineering analysis that steeper slopes would be safe, and such steeper slopes shall be approved by the BLM. Slopes shall not be steeper than is safe considering actual rock strength and structural conditions encountered. Pit slope angles in the West Pit and East Pit shall be re-evaluated after one (1) year of mining of that pit. ▸ 4.1.1-3: Approximately 40-foot wide benches shall be constructed at approximately 80-foot high intervals on mine pit slopes to catch loose rocks. Approval shall be obtained from the BLM prior to construction of mine pit benches which differ substantially from these specifications. ▸ 4.1.1-4: To avoid any substantial slumping or slope failure of the heap and waste rock stockpile slopes, the recommendations of the slope stability analyses of these facilities shall be followed during the construction of these facilities. ▸ 4.1.1-5: Project structures subject to the Uniform Building Code shall be designed and constructed consistent with the standards of Seismic Zone 4.
Resulting Impact:	No substantial slumping or failure of the ore heap, waste rock stockpile, of pit slopes is anticipated. Buildings should not fail due to seismic shaking.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Issue:	Subsidence
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	No subsidence from ground water pumping is anticipated.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Issue:	Naturally occurring radioactive materials
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	No substantial increase in naturally occurring radioactive materials is anticipated
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
GEOLOGY AND MINERAL RESOURCES			
Slope stability and seismic effects			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	No impact
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
Subsidence			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	No impact
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
Naturally occurring radioactive materials			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	No impact
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	**GEOLOGY AND MINERAL RESOURCES (continued)**
Issue:	**Loss of mineral potential**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Potential mineral resources may be lost through complete or partial backfilling of pits.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Resource:	**SOIL RESOURCES**
Issue:	**Loss of soil resources**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.2-1: Surface disturbance shall be kept to the minimum that is required to construct and operate the project. ▸ 4.1.2-2: Soils shall be salvaged from all areas where sufficient soil development is noted in conformance with the approved Reclamation Plan. Soils shall be salvaged to the greatest depth practicable and placed in stockpiles clearly delineated with signs to assure the material is not mistaken as waste rock. Soil stockpiles shall be located away from washes and other areas prone to erosion and consolidated as appropriate to reduce disturbance to undisturbed areas within the Project mine and process area. Stockpiles shall be kept shallow and dry, if not to be used within one (1) year of initial placement, to protect seeds. ▸ 4.1.2-3: All mine facilities shall be designed and constructed with erosion control features engineered to meet the performance standards of 14 CCR 3706, including the control of runoff and protection of areas susceptible to erosion from surface flows. ▸ 4.1.2-4: A Storm Water Pollution Prevention Plan, incorporating the use of Best Management Practices for erosion control, shall be developed and implemented in accordance with the California Storm Water NPDES permit program.
Resulting Impact:	Soils would be lost through direct disturbance and from erosion, either from precipitation falling directly within the Project mine and process area, or from flow events in the ephemeral washes.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Resource:	**HYDROLOGY (SURFACE WATERS)**
Issue:	**Stream flow alterations**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.3.1-1: Major watercourses shall be diverted only to the extent necessary to protect Project facilities, and shall be diverted back into the same wash system after as short a diversion as practical. Permanent diversion channels shall be built to approximate the original drainage system in both gradient and channel geometry, and shall be engineered to adequately contain and deliver stream flows resulting from the 100-year/24-hour precipitation event. The diversion system shall also be designed to adequately contain and deliver stream flows predicted from the 500-year, 24-hour precipitation event. ▸ 4.1.3.1-5: Diversion channels shall be designed to prevent the abrupt diversion of flows from their natural courses, and shall provide sufficient natural protective materials at the points of diversions where necessary to protect the diversion works. All designs for the diversion channels shall be signed and stamped by an engineer registered to practice in California and submitted to the Imperial County Public Works Department for approval prior to commencement of construction.
Resulting Impact:	The diversion of the five (5) ephemeral drainage channels within the Project mine and process area would not result in substantial alterations of the flow in downstream reaches and would not overflow during extraordinary flow events.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
GEOLOGY AND MINERAL RESOURCES (continued)			
Loss of mineral potential			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
No mining of East Pit. Less backfilling of West Pit.	No mining of West Pit.	Complete backfilling of all pits.	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
SOIL RESOURCES			
Loss of soil resources			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Somewhat less disturbance and erosion potential than Proposed Action	Slightly less disturbance and erosion potential than Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
HYDROLOGY (SURFACE WATERS)			
Stream flow alterations			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Only three (3) drainage channels would be diverted, but otherwise same as Proposed Action	Only three (3) drainage channels would be diverted, but otherwise same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant

PROPOSED ACTION

Resource:	HYDROLOGY (SURFACE WATERS) [continued]
Issue:	**Stream sediment and quality degradation**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.3.1-2: All chemicals shall be stored in conformance with applicable local, state and federal regulations. All non-mining wastes shall be stored in secondary containment areas, as required, and disposed of off-site in an approved landfill. Regulated wastes shall be recycled or disposed of in conformance with all applicable local, state and federal laws and regulations, and in a manner approved by the responsible regulatory agencies. ▸ 4.1.3.1-3: Major maintenance of equipment shall be conducted within the concrete-paved and bermed areas of the maintenance yard to the extent possible to minimize accidental discharges of waste lubricants and other materials to the ground. ▸ 4.1.3.1-4: Each phase of the heap leach pad system (heap, pad, ponds, etc.) shall be designed to provide for 100-percent containment of the precipitation from the maximum probable one (1)-hour storm event occurring simultaneously with a 24-hour power outage while still maintaining a two-foot freeboard in the process and overflow ponds, and shall be consistent with the requirements of the CRWQCB.
Resulting Impact:	Erosion of Project facilities would be minimal and not result in sedimentation of washes; and spills or leaks of Project chemicals would be minimized and contained, and the potential for the process facility ponds to fail or overtop is low, so that surface water degradation would be minimal.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Issue:	**Floodplain encroachment**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.3.1-6: Project facilities shall not be constructed within special flood hazard zones (Zone A) as noted on Federal Emergency Management Agency (FEMA) National Flood Insurance Program Flood Insurance Rate Map (FIRM) for Imperial County, California (Unincorporated Areas), Panel 700 of 1175, Community-Panel Number 060065 0700 B, Effective Date: March 15, 1984, except as may be authorized by a Development Permit approved by the Imperial County Flood Administrator pursuant to Division 4 of Title 7 of the codified ordinances of Imperial County and, if applicable, restrictions contained in the approvals of the appropriate federal authorizing agencies.
Resulting Impact:	Project facilities would not be sited or constructed in identified floodplain areas without the required permit.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Issue:	**Ground water inflows**
Measures Incorporated by Project Design or Regulation:	None (see also measures listed under Biological Resources)
Resulting Impact:	The potential for formation of a pit lake is eliminated, and surface water quantity and quality would not be adversely affected by any ground water inflows into the open pit(s) or waste rock backfilled into the pit(s).
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
HYDROLOGY (SURFACE WATERS) [continued]			
Stream sediment and quality degradation			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
Floodplain encroachment			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
Ground water inflows			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	**HYDROLOGY (SURFACE WATERS) [continued]**
Issue:	**"Waters of the United States"**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.3.1-7: Applicant shall acquire and comply with the necessary approvals from the U.S. Army Corps of Engineers for all jurisdiction "waters of the United States" under Section 404 of the Clean Water Act which may be dredged or filled through Project actions.
Resulting Impact:	Some jurisdictional "waters of the United States" located in the ephemeral stream channels would be dredged or filled by the Project.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Resource:	**HYDROLOGY (GROUND WATERS)**
Issue:	**Ground water production**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.3.2-1: To prevent excessive drawdown or possible damage to the well or pumping system, ground water production from well PW-1 shall be limited to a maximum average of 550 gpm unless a higher pumping rate, supported by reasonable proof of increased well efficiency, is approved by the ICPWD. The maximum average production rate from each additional production well drilled shall be limited to that rate which prevents excessive drawdown or possible damage to the well or pumping system. ▸ 4.1.3.2-2: The total annual ground water production rate shall not exceed 1,200 afy. ▸ 4.1.3.2-6: Applicant shall obtain approval from the ICPWD of a "Ground Water Management Ordinance" permit prior to drilling any ground water production well intended for continued use. Production of ground water from the Project ground water well field shall be monitored and reported to the ICPWD consistent with the requirements of this permit.
Resulting Impact:	Individual well and total ground water well field production rates will not produce substantial drawdowns in other existing wells and will not excessively draw down or damage the aquifer.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Issue:	**Ground water quality**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.3.2-3: Ground water production and monitoring wells shall be plugged and abandoned in conformance with applicable regulatory requirements, including 14 CCR 3713(a). ▸ 4.1.3.2-4: The heap leach pad shall be designed, constructed and operated in conformance with the specifications, requirements and prohibitions of Waste Discharge Requirements issued by the CRWQCB. ▸ 4.1.3.2-5: The heap leach pad shall be monitored in conformance with the requirements of the Monitoring and Reporting Program issued by the CRWQCB. This would include collection of groundwater quality baseline data prior to mine development.
Resulting Impact:	Spills or leaks of Project chemicals would be minimized and contained; the potential for the process facility ponds or leach pad liner to leak is low; and rain water moving through waste rock stockpiles would not leach substantial metals; so that the potential for ground water degradation would be minimal.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
HYDROLOGY (SURFACE WATERS) [continued]			
"Waters of the United States"			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
29 percent fewer acres than the Proposed Action would be dredged or filled	17 percent fewer acres than the Proposed Action would be dredged or filled	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
HYDROLOGY (GROUND WATERS)			
Ground water production			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
A maximum of two (2) wells would be drilled, and less than one-half of the water would be produced, but otherwise same as Proposed Action	A maximum of three (3) wells would be drilled, and approximately two-thirds of the water would be produced, but otherwise same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
Ground water quality			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Somewhat less than Proposed Action	Slightly less than Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant

PROPOSED ACTION

Resource:	**HYDROLOGY (GROUND WATERS) [continued]**
Issue:	**Pit water quality**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	No impacts to ground water quality are expected to occur from the complete or partial backfilling of any of the pits.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Resource:	**AIR RESOURCES**
Issue:	**Compliance with ambient air quality standards**
Measures Incorporated by Project Design or Regulation:	• 4.1.4-1: Chemical dust suppressant treatments, in combination with water sprays, shall be applied to the haul and maintenance roads within the Project mine and process area to minimize the generation of fugitive PM_{10}. Only chemical dust suppressants acceptable to all appropriate agencies shall be applied, and the application rates and frequencies, for both the dust suppressant and water, shall be consistent with the guidance of the manufacturer to achieve optimal suppression of dust. Dust suppressant and/or water shall be applied no less than twice per day on days without precipitation unless road surface moisture is documented as sufficient to achieve maximum suppression of fugitive dust emissions without the additional dust suppressant or water. • 4.1.4-2: Project employees, contractors, and visitors shall be advised of the need to adhere to speed limits to minimize the generation of fugitive dust. Applicant shall develop and implement appropriate measures to strengthen compliance with posted speed limits to prevent the generation of fugitive dust. • 4.1.4-3: Shrouding of the lime discharge to the ore trucks, or equivalent RACM for these fugitive PM_{10} emissions, shall be implemented and maintained. • 4.1.4-4: Water sprays or dust suppressants (chemical treatments acceptable to all appropriate agencies) shall be applied to Indian Pass Road from its intersection with Ogilby Road to the boundary of the Project mine and process area with sufficient frequency to minimize the emissions of fugitive PM_{10} from Project traffic on Indian Pass Road. • 4.1.4-5: All disturbed surfaces no longer needed for project activities shall be reclaimed as soon as practical to minimize fugitive PM_{10} emissions from wind erosion. • 4.1.4-6: All permits required by the ICAPCD shall be obtained, and all operations conducted in compliance with the conditions of these permits. • 4.1.4-7: All fuels used at the Project shall conform to the CARB low-sulfur requirements in order to minimize SOx emissions from Project-related vehicular activities.
Resulting Impact:	Project emissions of NO_x, SO_x and CO from mobile combustion sources and PM_{10} from fugitive emission sources would result in maximum ambient concentrations of these pollutants below the applicable ambient air quality standards, although maximum ambient concentrations of NO_x and PM_{10} would be close to the applicable ambient air quality standards with the addition of background ambient concentrations; the Project would contribute to exceedences of the 24-hour CAAQS for PM_{10} which may continue to occur in the future during periods of high wind.
Level of Significance of Resulting Impact:	Cumulatively significant for PM_{10}, Not significant otherwise
Mitigation Measures:	• 4.1.4-9: Applicant shall, in consultation with the ICAPCD, establish and maintain one (1) meteorological monitoring station (for wind speed and wind direction) and two (2) PM_{10} monitoring stations (6-day high volume samplers) to monitor project the ambient concentrations of PM_{10} which may be generated by Project activities. It shall be the intent of the two (2) PM_{10} monitors to be located in generally an upwind and downwind arrangement and operated simultaneously to provide information on the Project's effects on ambient PM_{10} concentrations. Should the monitoring show that Project operations may be contributing to a significant increase in ambient PM_{10} concentrations, then the Applicant shall review its procedures for reducing PM_{10} emissions and recommend to the ICAPCD methods which could be applied to reduce these emissions sufficiently to eliminate the significant increase.
Level of Significance after Mitigation:	Cumulatively significant for PM_{10}, Not significant otherwise

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
HYDROLOGY (GROUND WATERS) [continued]			
Pit water quality			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
AIR RESOURCES			
Compliance with ambient air quality standards			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although project emissions would end substantially sooner	Same as Proposed Action, although project emissions would end somewhat sooner	Same as Proposed Action, although highest project emission rates would continue longer	None
Cumulatively significant for PM_{10}, Not significant otherwise	Cumulatively significant for PM_{10}, Not significant otherwise	Cumulatively significant for PM_{10}, Not significant otherwise	Cumulatively significant for PM_{10}
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Cumulatively significant for PM_{10}, Not significant otherwise	Cumulatively significant for PM_{10}, Not significant otherwise	Cumulatively significant for PM_{10}, Not significant otherwise	Cumulatively significant for PM_{10}

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	AIR RESOURCES (continued)
Issue:	**Other air quality related health concerns**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Fugitive dust emissions from initial disturbance would not result in substantial emissions of the spores which cause "valley fever."
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	• 4.1.4-8: Appropriate measures, such as water sprays, dust suppressants (chemical treatments acceptable to all appropriate agencies), or reduced operating speeds, shall be applied to all activities which disturb the top foot of soil in any areas during construction and reclamation activities to minimize emissions of fugitive PM_{10} which may contain *Coccidiodes immitis* spores. Project employees, contractors, and visitors shall be advised to use appropriate precautions regarding the inhalation of dust while in the Project area during the initial construction/reclamation phases to minimize exposure to *Coccidiodes immitis* spores.
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
AIR RESOURCES (continued)			
Other air quality related health concerns			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Somewhat less than Proposed Action	Slightly less than Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant

PROPOSED ACTION

Resource:	**BIOLOGICAL RESOURCES**
Issue:	**Reclamation of vegetation and plant habitat**
Measures Incorporated by Project Design or Regulation:	• 4.1.5-16: Upon completion of mining activities, Applicant shall remove all equipment and materials from the Project area. Unless explicitly directed otherwise by the BLM (in consultation with the CDFG), all diversion channel lining materials and rip rap shall be removed from the diversion channels and any necessary reclamation completed by the Applicant, consistent with the approved Reclamation Plan. • 4.1.5-17: The Project Reclamation Plan shall include the collection of both fairy duster seeds and winged cryptantha seeds and distribution of the collected seeds of both species within appropriate microhabitats within the Project mine and process area. During Project operations, the Applicant shall experiment with the seeds (and transplants if reseeding is not successful), of both species to assure plant success and survival. Recovery of these two (2) species shall be considered successful when species density meets or exceeds the criterion set in the Approved Reclamation Plan. • 4.1.5-18: Applicant shall stockpile available soil from the wash channels to be disturbed within the Project mine and process area and store the soil for subsequent use during reclamation activities. Soil stockpiles shall be located away from washes and other areas prone to erosion and consolidated as appropriate to reduce disturbance to undisturbed areas within the Project mine and process area. Stockpiles shall be kept shallow and dry, if not to be used within one (1) year of initial placement, to protect seeds. • 4.1.5-19: Applicant shall salvage specimens of selected plant species from the Project mine and process area prior to construction to be utilized during Project reclamation, habitat enhancement activities, or other reclamation needs. Plant species may include cactus, ocotillo, ironwood, palo verde, or other appropriate species identified by the BLM. • 4.1.5-20: Applicant shall implement weed control measures such that all introduced plants (e.g., salt cedar (*tamarisk species*), mustard, and other noxious weeds) would not become established within the Project area. Manual or mechanical means of control shall be the preferred methods employed. Use of other methods (e.g., herbicides) shall require approval by the BLM. The weed control measures shall be implemented within six (6) months of when noxious weeds are visually identified within the Project area and shall continue over the life of the Project. Tamarisk species shall be actively controlled throughout the life of the Project by eradication of any seedlings or growth observed. A portion of the reclamation bond in an amount determined appropriate by the BLM and Imperial County shall be retained to fund an eradication program to eliminate factor(s) conducive to tamarisk growth (e.g., moist areas) if tamarisk is determined to be a continuing problem after the completion of reclamation. • 4.1.5-21: Applicant shall implement the revegetation program contained in the Project Reclamation Plan approved by Imperial County and the BLM. The revegetation program shall include a test plot program, surface contouring and shaping, salvage and distribution of stockpiled soils, collection of a seedbank of seeds from within and in the vicinity of the Project area, preparation of seedbeds, seeding with approved mixtures of native plant species endemic to the area, planting of the plants salvaged from the area prior to mine construction, monitoring for invasion of noxious weeds or salt cedar, and vegetation success monitoring. The standards for revegetation success shall be specific to each vegetation type and based on reasonably achievable results that shall provide a plant cover and density sufficient to support long-term revegetation. Final bond release shall occur when the vegetation success criteria set forth in the Reclamation Plan have been met and the reestablishment of vegetation is confirmed. • 4.1.5-22: Applicant shall integrate the revegetation program activities with other stabilization and reclamation activities required by the approved Reclamation Plan. • 4.1.5-23: Access roads which are created, or any other areas which are disturbed, for the construction of the transmission line, pipeline, and well field shall be reclaimed where they are not needed for ongoing maintenance. Reclamation methods shall include regrading, surface preparation, and revegetation either through seeding or natural processes. • 4.1.5-24: To compensate for those lands not reclaimed within the East Pit, Applicant shall perform reclamation activities on one or more off-site locations on land in the vicinity of the Project acceptable to Applicant, and the BLM, as appropriate, to reclaim habitat which has been adversely impacted by previous actions unrelated to the Project. • 4.1.5-25: Applicant shall repair any detected leak in the water pipeline along Indian Pass Road immediately in order to prevent tamarisk invasion and eliminate an attractive nuisance to wildlife.
Resulting Impact:	Substantial vegetation and plant habitat would be disturbed, but concurrent and final reclamation would revegetate and reestablish plant habitat over all of the disturbed areas except the slopes of the open East Pit.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Other Measures:	• 4.1.5-51: A Revegetation and Monitoring Review Committee shall be formed to serve in an advisory capacity to the BLM and Imperial County. The committee shall review the annual vegetation monitoring reports filed by the Applicant for the purpose of interpreting the information contained in the reports, advising the Applicant of actions it might take to improve the success of its revegetation efforts, and advising the BLM and Imperial County as to adjustments which should be made to the revegetation success standards. The composition of the committee shall be proposed by the Applicant and approved by the BLM and Imperial County.

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
BIOLOGICAL RESOURCES			
Reclamation of vegetation and plant habitat			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Somewhat less disturbance than Proposed Action	Slightly less disturbance than Proposed Action	Same disturbance as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None

Resource:	BIOLOGICAL RESOURCES (continued)
Issue:	Disturbance to microphyll woodland habitat
Measures Incorporated by Project Design or Regulation:	▸ 4.1.5-7: Applicant shall construct a fence, no less than four (4) feet in height with 3-strands of smooth wire, or equivalent, around the approximately 40-acre south-central portion of the central wash within the Project mine and process area which is not intended to be disturbed by Project operations to prevent accidental surface disturbance of the microphyll woodland habitat in this internal area during mine construction and operation. ▸ 4.1.5-8: Applicant shall provide periodic slug irrigation to enhance the establishment of ironwood and deer browse vegetation within the surface drainage identified by Mitigation Measure 4.1.5-7 to enhance the quality of habitat and provide established deer browse which would be immediately available at the end of the active life of the mine. Vegetation selected for enhanced deer browse establishment shall be comprised of species known to occur in the Project area. The irrigation shall be reduced and then ceased once the vegetation is established. The composition of the seed mix and the design of the vegetation enhancement measures shall be submitted to the CDFG for approval prior to implementation. ▸ 4.1.5-10: Applicant shall provide periodic slug irrigation to enhance the establishment of ironwood and deer browse vegetation along the western slopes and banks of the approximately 3,000-foot section of the existing ephemeral stream channel immediately adjacent to, but outside of, the east-southeast boundary of the Project mine and process area. Vegetation selected for enhanced deer browse establishment shall be comprised of species known to occur in the Project area. Supplemental watering shall only be conducted for the first few years to allow the plants to become established. Water shall be reduced over a period of time to enable the plants to acclimate to natural moisture conditions. The composition of the seed mix and the design of the vegetation enhancement measures shall be submitted to and approved by the CDFG prior to implementation. ▸ 4.1.5-11: Applicant shall conduct annual transect surveys in the spring season of the ephemeral washes which flow out of the Project mine and process area, the principal washes which flow into the Project mine and process area upstream of the Project mine and process area to serve as a control, and the undisturbed ephemeral washes within the Project mine and process area, for the purpose of determining if Project construction and/or operations are having an indirect adverse effect on microphyll woodland habitat not directly effected by surface disturbance. The surveys shall document the diversity, density, and cover of the vegetation directly associated with the washes, and shall include observations regarding the general "health" of the vegetation. The surveys shall also document any observations regarding sediment transport processes within the washes any incidental sightings of deer fawn, bighorn sheep, bobcat, kit fox, mountain lion, or other species specified by the BLM. An annual report of the results of the surveys shall be prepared and submitted to the BLM and CDFG in a form acceptable to the BLM. If, as a result of these surveys, microphyll woodland habitat downstream of the Project mine and process area are determined to be adversely impacted by the Project, appropriate additional mitigation measures may be required by the BLM and shall be implemented by the Applicant. BLM may require the Applicant to acquire title to off-site private lands with comparable microphyll woodland habitat, in a location acceptable to the BLM and the Applicant, to compensate at a 3:1 ratio for adverse impacts to microphyll woodland habitat not otherwise compensated for which cannot be mitigated through application of these additional mitigation measures. ▸ 4.1.5-12: Applicant shall construct all stream channel diversions to divert flows back into the same major wash system and ensure the continuing flow of an equivalent pre- and post-Project quantity of water through the major drainages to preserve the downstream microphyll woodland habitat within the drainages ▸ 4.1.5-13: Applicant shall implement the Project Reclamation Plan in conformance with the requirements of the BLM and Imperial County. The Reclamation Plan shall include a program for revegetation of the permanent diversion channels, including the planting of seedlings of young ironwood and palo verde at a density approximating that of the displaced washes and seeding of the pre-Project wash habitat. The transplanted seedlings shall be protected from browsing or trampling by wire cages for the first two (2) years and from excessive sun by shade material, if necessary, or native nurse plants, if available and necessary, to facilitate transplant success. Microphyll woodland vegetation within the permanent diversion channels shall be established during early mining operations and managed and monitored throughout the life of the Project. Applicant shall conduct annual transect surveys in the spring season of the diversion channels for the purpose of determining revegetation success. The surveys shall document the diversity, density, and cover of the vegetation directly associated with the washes, and shall include observations regarding the general "health" of the vegetation. An annual report of the transect surveys shall be prepared and submitted to the BLM, Imperial County and CDFG in a form acceptable to the BLM and Imperial County. Should the surveys indicate that the revegetation of the diversion channels may not meet the standards required by the approved Reclamation Plan, the BLM and Imperial County may require appropriate additional revegetation measures to be implemented by the Applicant. ▸ 4.1.5-15: Project actions would require the realignment of sections of washes. Applicant shall develop a specific plan for approval of the BLM that ensures maintenance of intermittent flood water flow down these realigned wash channels into unmodified drainage boundaries outside of the Project in order to preserve vegetation and wildlife habitat. Design of these sections of realigned wash shall also include appropriate dimensions and slopes to accommodate continued use by wildlife during mining operations and to facilitate revegetation. A specific plan shall be prepared by Applicant and submitted to the ICPWD and BLM for review, and approval of the BLM, prior to the onset of any activities that would result in disturbance to these drainages. Plan design shall include the vegetation of channel diversions with native species that include ironwood and palo verde in order to maintain continuity of washes and enhance wildlife habitat, in conformance with the approved Reclamation Plan. Unless explicitly directed otherwise by the BLM (in consultation with the CDFG), all diversion channel lining materials and rip rap shall be removed from the diversion channels.

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
BIOLOGICAL RESOURCES (continued)			
Disturbance to microphyll woodland habitat			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	**BIOLOGICAL RESOURCES (continued)**
Issue:	**Disturbance to microphyll woodland habitat (continued)**
Measures Incorporated by Project Design or Regulation (continued):	▸ 4.1.5-26: Applicant shall enter into a Stream Alteration Agreement with the California Department of Fish and Game (CDFG) as required pursuant to California Fish and Game Code Section 1603 which shall contain those measures which CDFG and Applicant agree may be necessary, or appropriate, to mitigate, and compensate for, the impacts of the Project on the stream channels and associated microphyll woodland habitat and wildlife. The July 11, 1997 draft of the Stream Alteration Agreement for the Imperial Project includes the following substantive requirements, which are subject to modification until agreed to by both parties: (1) Applicant shall acquire title to off-site private lands with comparable microphyll woodland habitat, in a location acceptable to the CDFG and the Applicant, to compensate at a 3:1 ratio for microphyll woodland directly impacted as a result of the Project. Ownership of the acquired land shall be transferred to the CDFG for long term habitat management. (2) Applicant shall construct and/or maintain over the life of the Project three (3) big game and/or small game guzzlers in a design and location acceptable to the CDFG, Applicant, and BLM, as appropriate, to enhance the habitat for deer and other wildlife. One (1) additional guzzler shall be installed and maintained on the acquired off-site mitigation lands. The guzzlers shall be designed and constructed in a manner which allows desert tortoise to readily exit the guzzlers. (3) Approximately 40 acres of habitat within the Central Wash area shall be fenced to prevent human intrusion. The fencing shall be 4-strand smooth wire to allow wildlife movement and the bottom shall be fenced for the exclusion of tortoises. (4) Surrounding microphyll woodlands shall be enhanced through various methods (e.g. irrigation, replanting with native species). (5) In those Project areas where nesting birds may occur, the Operator either shall not remove potential nesting riparian (*sic*) vegetation from March 15 through July 30, or shall survey all potential nesting riparian (*sic*) vegetation within the Project area for active bird nests. If an active bird nest is located, the nest site shall be flagged or staked a minimum of five (5) yards in all directions, and this flagged zone shall not be disturbed until the nest becomes inactive, unless otherwise directed by the CDFG. ▸ 4.1.5-28: Project actions may require either an individual dredge and fill permit (404 permit) from the U.S. Army Corps of Engineers (ACOE) or operate under one or more Nationwide Permits. Applicant shall obtain the appropriate authorization from the ACOE prior to the onset of any actions that would disturb drainages within the Project area. ▸ 4.1.5-29: The California Regional Water Quality Control Board, Colorado River Basin Region (CRWQCB) shall be notified by the Applicant of Project actions, and Applicant shall comply with CRWQCB requirements for obtaining Waste Discharge Requirements and Certification under Section 401 of the Clean Water Act for proposed discharges to land and a general Storm Water Permit.
Resulting Impact:	Approximately 90 acres of microphyll woodland habitat would be would be disturbed, but the carrying capacity of adjacent habitat would be enhanced, concurrent and final reclamation would start to reestablish about one-half of this disturbed habitat within the area of the Proposed Action, and three times this disturbed amount would be purchased and protected off-site.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Issue:	**Disturbance to wildlife and wildlife habitat**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.5-1: Applicant shall construct a fence around the entire Project mine and process area. The fence shall be constructed no less than four (4) feet in height with 3-strands of smooth wire, or equivalent. That portion of the perimeter fence constructed along the western boundary of the Project mine and process area, including all of the fenceline adjacent to Indian Pass Road (see Figure 2.2), shall be a chain-link fence, no less than six (6) feet in height, to restrict public access to the Project mine and process area. The entire perimeter fence shall include desert tortoise exclusion fencing, in conformance with responsible agency requirements, to inhibit tortoise access to Project facilities (see also Mitigation Measure 4.1.5-40). Applicant shall construct a chain-link fence, no less than six (6) feet in height, with one (1) foot of barbed wire at the top, around the ore leach pad, process facilities, and fresh water pond to further restrict wildlife from accessing these facilities. Applicant shall routinely inspect and repair the fences, as necessary. Applicant shall document any deer or other wildlife mortalities observed within the Project mine and process area, shall monthly report such mortalities to the BLM and the CDFG, and shall work with the BLM and CDFG to implement additional or amended measures to reduce the mortalities. A field contact representative (FCR) shall be responsible for maintaining the records of perimeter fence inspections and repair, and shall have authority to direct the repair of damaged or destroyed fences. The FCR may be a project manager, company environmental coordinator, contract biologist, or other person identified as responsible by the Applicant. ▸ 4.1.5-2: Applicant shall prohibit cross-country use of vehicles and equipment except within those portions of the Project mine and process area subject to surface disturbance.

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
BIOLOGICAL RESOURCES (continued)			
Disturbance to microphyll woodland habitat (continued)			
Same as Proposed Action, although only 52 acres of microphyll woodland habitat would be disturbed	Same as Proposed Action, although only 62 acres of microphyll woodland habitat would be disturbed	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
Disturbance to wildlife and wildlife habitat			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	BIOLOGICAL RESOURCES (continued)
Issue:	**Disturbance to wildlife and wildlife habitat (continued)**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.5-3: Applicant shall cover the pregnant and barren solution ponds with either small-mesh nets; a solid, 40-mil, HDPE/polypropylene cover; floating plastic balls; or equivalent cover acceptable to the BLM to keep wildlife out of the ponds. Applicant shall maintain the cover over the life of the Project. Applicant shall keep records of all wildlife kills which may be associated with the use of cyanide by the project, including all dead wildlife found in or adjacent to the ponds or heap. Individual threatened and endangered species found dead on the Project mine and process area shall be sent for necropsies. Observations of wildlife killed in the ponds or on the heap shall be reported to the BLM, CDFG, and the U.S. Fish and Wildlife Service (USFWS) monthly for evaluation and, if determined necessary, for possible imposition of additional mitigation requirements. ▸ 4.1.5-4: Applicant shall advise Project employees, contractors, and visitors of the need to adhere to speed limits and to avoid any animals, including the desert tortoise, flat-tailed horned lizard, and deer which may be encountered on or crossing the road to and from the Project area. Applicant shall also require Project employees, contractors, and visitors to report all incidences of wildlife injury or mortality resulting from Project-related vehicle traffic on roads used to access the Project to the FCR, who shall monthly report these incidences to the BLM and the CDFG. Applicant shall participate in agency efforts to reduce mortality of wildlife on the roads used as access to the Project when so requested by the BLM. ▸ 4.1.5-5: Prior to completion of mining, Applicant shall conduct an assessment of the potential for a pit lake to form in the East Pit. If the assessment indicates a reasonable potential for a pit lake to form, Applicant shall backfill the East Pit to an elevation higher than the level of any pit lake which may be predicted to form from the inflow of ground water and, thereby, prevent the creation of an attractive nuisance for wildlife. The findings of the pit lake assessment shall be completed and submitted for approval by the BLM prior to the completion of mining activities. Applicant shall monitor open pit areas monthly during the duration of post-mining reclamation for any evidence of the formation of a pit lake. The results of this monitoring shall be reported monthly to the BLM. Should the BLM determine that the monitoring indicates that a pit lake is forming or may form, the Applicant may be required to conduct an additional study or place additional backfill material into the bottom of the East Pit. ▸ 4.1.5-6: Before removal of the perimeter fence at the end of the active life of the Project, Applicant shall regrade haul roads within the open pit such that wildlife or humans may still use them to exit the residual open pit should they pass the barricade around the rim. ▸ 4.1.5-9: Applicant shall construct and maintain during the life of the Project three (3) big game guzzlers in a design and location acceptable to the BLM and the CDFG in the general vicinity of the Project mine and process area to provide for more intensive use of the existing habitat by deer and other wildlife. Within one (1) year of approval of the ROD, the Applicant shall have either: provided sufficient funds to a third party (acceptable to BLM and CDFG) which shall construct, own, and operate the guzzler; or completed construction of the guzzler. Applicant or the acceptable third party shall obtain the required permits from the BLM prior to guzzler construction. The guzzler shall remain after reclamation. ▸ 4.1.5-14 Applicant shall construct and maintain as a part of final reclamation, one or more big game and/or small game guzzlers within the Project mine and process area in a design and location acceptable to the BLM and the CDFG to enhance the area as habitat for deer and other wildlife. Final Project reclamation bond(s) shall not be released until either: the Applicant has provided sufficient funds to a third party (acceptable to BLM and CDFG) which shall construct, own, and operate the guzzler; or the Applicant has completed construction of the guzzler. Applicant or the acceptable third party shall obtain the required permit from the BLM prior to guzzler construction. The guzzler shall remain after reclamation. The guzzler shall be designed and constructed in a manner which allows desert tortoise to readily exit the guzzler.
Resulting Impact:	Wildlife habitat would be temporarily eliminated over all disturbed areas and wildlife movements altered, but the carrying capacity of adjacent habitat would be enhanced, concurrent and final reclamation would start to reestablish this habitat, and an amount equal this disturbed acreage would be purchased and protected off-site. Should mining be suspended or terminated prior to either partial or complete backfilling of the West Pit and Singer Pit, wildlife could be injured or killed by falling into the pit or being attracted by a pit lake.
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	▸ 4.1.5-48: Should mining be terminated prior to backfilling of the West Pit above the ground water level, Applicant shall conduct an assessment of the probability of the formation of a pit lake after mining. Any evaluation of the potential for the formation of a pit lake in an open pit shall consider the quantity of surface flow runon and direct precipitation. If the assessment reasonably indicates that ground water encountered in the West Pit may enter the pit in sufficient quantity, considering evaporation, to create a pit lake, the Applicant shall place sufficient backfill into the open portion of the West Pit to raise the floor of the pit to a level higher than the level of any pit lake which the study indicates may form. ▸ 4.1.5-49: Any pit left open following the completion of mining shall be left in a condition which minimizes the potential for, and quantity of, water which may enter the pit through surface water runon. In addition, the bottom of any pit left open after the completion of mining shall be composed of a layer of loose rubble to minimize the potential for the formation of standing water in the bottom of the pit from either precipitation or surface water runon. ▸ 4.1.5-50: Before removal of the perimeter fence, Applicant shall regrade haul roads within the open pit(s) such that wildlife or humans may still use them to exit the residual open pit(s).

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
BIOLOGICAL RESOURCES (continued)			
Disturbance to wildlife and wildlife habitat (continued)			
Same as Proposed Action, although disturbed acres would be reduced by 38 percent	Same as Proposed Action, except that disturbed acres would be reduced by 19 percent	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None

PROPOSED ACTION

Resource:	BIOLOGICAL RESOURCES (continued)
Issue:	Disturbance to wildlife and wildlife habitat (continued)
Level of Significance after Mitigation:	Not significant
Other Measures:	▸ 4.1.5-52: Chuckwallas shall be moved away from any threats (approximately 100 meters outside the perimeter fence) during construction activity and if found within the Project mine and process area during mining operations. ▸ 4.1.5-53: To prevent the inadvertent electrocution of raptors, unless otherwise agreed to by the authorized officer in writing, transmission and distribution lines shall be constructed in accordance with standards outlined in the publication "Suggested Practices for Raptor Protection on Power Lines" (Raptor Research Foundation, Inc., 1996). The right-of-way holder shall assume the burden and expense of proving that pole designs not shown in this publication are "raptor safe." Such proof shall be provided by a raptor expert approved by the authorized officer. The BLM reserves the right to require modifications or additions to all power line structures placed on these rights-of-way should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the United States. ▸ 4.1.5-54: Trash and food items shall be contained in closed containers to reduce attractiveness to opportunistic predators such as ravens, coyotes, and kit foxes. ▸ 4.1.5-55: Recreational firearms and pet dogs shall be prohibited from the Project mine and process area. ▸ 4.1.5-56: Applicant shall contact local animal control agents to remove feral dogs that are observed within the Project area.
Issue:	Impacts to listed species
Measures Incorporated by Project Design or Regulation:	▸ 4.1.5-27: Applicant shall comply with all of the terms and conditions of the Biological Opinion prepared for the Project by the U.S. Fish and Wildlife Service in response to the BLM request for formal consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended.
Resulting Impact:	The Project would result in the "take" of the federal- and state- listed desert tortoise.
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	▸ 4.1.5-30: Applicant shall designate a field contact representative (FCR) who shall be responsible for overseeing compliance with protective stipulations for listed species. The FCR shall have authority to halt all activities that are in violation of the stipulations. The FCR shall have a copy of all appropriate stipulations when work is being conducted within the Project area. The FCR may be a project manager, company environmental coordinator, contract biologist, or other person identified as responsible by the Applicant. Applicant shall provide the name and contact information of the FCR to the BLM and applicable responsible agencies prior to construction. ▸ 4.1.5-31: During the life of all Project activities, stockpiling of equipment and vehicles shall utilize only those portions of the Project area that would be subject to permanent disturbance. Temporary or inadvertent disturbance to remaining portions of the area should be minimized by: staking, "flagging," or otherwise clearly marking the boundaries of the alignment; notifying employees of the specific areas, boundaries of the areas, and the need to avoid disturbance to remaining areas; and posting signs or erecting temporary fencing at access points to limit access to authorized vehicles and equipment only. All employees shall be instructed that their activities shall be confined to locations within flagged or otherwise marked areas. The area of disturbance shall be confined to the smallest practical area, considering extent and location of ore bodies, topography, placement of facilities and access roads, locations of sensitive species, public health and safety, and other limiting factors. To the extent practical, previously disturbed areas within the Project mine and process area shall be used for the placement of equipment, work staging sites, or parking of vehicles. ▸ 4.1.5-32: Open pipeline trenches, test holes, or test trenches shall be regularly inspected by the FCR, or qualified biologist acceptable to the BLM, a minimum of three (3) times per day. During excavation of trenches or holes, escape ramps consisting of loose earth deposited in the test hole or trench shall be placed to facilitate the escape of any wildlife species that may inadvertently become entrapped. Any animals discovered shall either be allowed to escape before activities resume or carefully removed from the pit or trench and allowed to escape. A final inspection of the open trench segment or hole shall also be made by the FCR, or qualified biologist acceptable to the BLM, immediately prior to backfilling. Arrangements shall be made prior to the onset of maintenance or construction to ensure that listed wildlife species can be removed from the trench without violating any requirements of the federal or California Occupational Safety and Health Administration. All test holes shall be immediately capped or abandoned upon completion of drilling to prevent access of wildlife. ▸ 4.1.5-33: Toxic materials contained on the Project area shall be stored and used in a manner that prevents harm to desert tortoises and other wildlife species. Methods of containment shall be approved by the BLM. ▸ 4.1.5-34: Nets or other suitable coverings shall be placed over all ponds containing toxic solutions to prevent contact by area wildlife species, including bats. These coverings shall be regularly inspected and maintained by Applicant for the duration of the Project. Methods of cover, inspection, and maintenance shall be approved by the BLM.

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
BIOLOGICAL RESOURCES (continued)			
Disturbance to wildlife and wildlife habitat (continued)			
Not significant	Not significant	Not significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Impacts to listed species			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Somewhat less than the Proposed Action	Slightly less than the Proposed Action	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None

PROPOSED ACTION

Resource:	BIOLOGICAL RESOURCES (continued)
Issue:	Impacts to listed species (continued)
Mitigation Measures (continued):	▸ 4.1.5-35: Project employees involved with regular activities shall be required to take a threatened and endangered species education program which shall include a discussion of both endangered and threatened species and species that are not endangered or threatened. The program shall include information on the biology of listed, sensitive and unlisted species as well such as the desert tortoise, flat-tailed horned lizard, mule deer, big horn sheep, and bats and their occurrence in the Project area. The discussion shall include information on the measures being implemented for the protection of these species and their habitats during Project activities and means by which individual employees can facilitate this process. A program approved by BLM shall be employed and taught by a qualified individual acceptable to the BLM. Wallet-size cards signifying completion of training shall be issued to employees. All employees shall participate in the education program prior to commencing Project activities. New employees shall receive formal approved training prior to working on-site. The program shall typically last from between one and two hours and shall cover the following topics at a minimum: • Distribution in general and in the Project area; • General behavior and ecology; • Sensitivity to human activities; • Legal protection; • Penalties for violation of State and federal laws; • Reporting requirements; and • Project mitigation measures. ▸ 4.1.5-36: Incidences of observations of desert tortoises and their sign during activities shall be conveyed to the FCR during all Project activities. Employees shall be notified that they are not authorized to handle or otherwise move any desert tortoises encountered. ▸ 4.1.5-37: Tortoises commonly seek shade during the hot portions of the day. During mine project activities, employees shall be required to check under equipment and vehicles prior to moving such. If tortoises are encountered, the vehicle shall not be moved until such animals have voluntarily moved to a safe distance away from the parked vehicle. ▸ 4.1.5-38: If desert tortoises must be moved during any Project activities, the following procedures shall be implemented by persons authorized by the USFWS to handle desert tortoises: (1) Desert tortoises shall be handled only by an authorized tortoise handler and only when necessary. New latex gloves shall be used when handling each desert tortoise to avoid the transfer of infectious diseases between animals. Desert tortoises shall be moved the minimum distance possible within appropriate habitat to ensure their safety. In general, desert tortoises shall not be moved in excess of 1,000 feet for adults and 300 feet for hatchlings. An authorized tortoise handler should follow the general handling methods contained in the "Protocols for Handling Live Tortoises" (USFWS 1990). (2) Desert tortoises that are found above ground and need to be moved shall be placed in the shade of a shrub. All desert tortoises removed from burrows shall be placed in an unoccupied burrow of approximately the same size as the one from which it was removed. All excavation of desert tortoise burrows shall be done using hand tools, either by or under the direct supervision of an authorized tortoise handler. If an existing burrow is unavailable, an authorized tortoise handler shall construct or direct the construction of a burrow of similar shape, size, depth, and orientation as the original burrow. Desert tortoises moved during inactive periods shall be monitored for at least two days after placement in the new burrows to ensure their safety. An authorized tortoise handler shall be allowed some judgement and discretion to ensure that survival of the desert tortoise is likely. (3) If desert tortoises need to be moved at a time of the day when ambient temperatures could harm them (less than 40 degrees F or greater than 90 degrees F), they shall be held overnight in a clean cardboard box. These desert tortoises should be kept in the care of an authorized tortoise handler under appropriate controlled temperatures and released the following day when temperatures are favorable. All cardboard boxes shall be appropriately discarded after one use. (4) All desert tortoises moved shall be marked for future identification. An identification number using the acrylic paint/epoxy covering technique should be placed on the fourth costal scute (USFWS 1990). No notching should be authorized. To facilitate clearing the area of desert tortoises, excavation of burrows should begin no more than fourteen (14) days prior to the onset of surface disturbing activities, as long as a final survey is conducted within 24 hours of the onset of activities to ensure that desert tortoises have not returned to the work area.

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
BIOLOGICAL RESOURCES (continued)			
Impacts to listed species (continued)			

PROPOSED ACTION

Resource:	BIOLOGICAL RESOURCES (continued)
Issue:	Impacts to listed species (continued)
Mitigation Measures (continued):	▸ 4.1.5-39: In order to minimize any exposure risk to desert tortoises, a specially designed fence shall be constructed around all portions of the Project area containing pits, ponds, waste rock stockpiles, ore processing areas, maintenance areas, and surface facilities. The final fence design shall be discussed with and found acceptable to the USFWS, BLM, and CDFG. The desert tortoise exclusion fence must meet the following preliminary design specifications: (1) Fencing shall result in a non-breachable barrier, and its support structure may be comprised of a variety of materials; (2) Galvanized ½-inch diameter mesh and 36-inch wide hardware cloth shall be used; and (3) The hardware cloth shall be buried 12 inches underground, extend at least 24 inches above the ground, and be firmly attached to the bottom of the perimeter fence and other wildlife exclusion fences. ▸ 4.1.5-40: Following fence installation, and prior to initiation of mining, authorized biologists under the supervision of an authorized tortoise handler shall conduct a complete (i.e., 100%) survey for desert tortoises within the fenced area. All tortoises found shall be marked and removed from the fenced mine area for safe off-site release within 1,000 feet of the outside of the Project fence using protocols acceptable to the BLM, USFWS, and the CDFG. Prior to release, ten (10) of these tortoises (consisting, insofar as possible, equal sex ratios of adult animals) shall be equipped with radio transmitters, and a equal number of individual additional tortoises (consisting, insofar as possible, equal sex ratios of adult animals) from the "resident" tortoise population outside of the Project mine and process area shall also be equipped with radio transmitters. These tortoises shall then be monitored to determine their survival rates and the impacts on resident tortoises. Data shall be collected weekly over a three year period during the activity period of this species in order to develop a model relating habitat composition (vegetation, soil suitability for burrowing, forage availability, conspecific densities, etc.) and tortoise density to carrying capacity. A goal of the model would be to provide valuable information on the effects of relocating tortoises. Prior to the implementation of this study the USFWS, CDFG, and BLM shall be consulted. ▸ 4.1.5-41: At the conclusion of Project pre-activity surveys and the relocation of any desert tortoises outside of the Project fence, Applicant and an authorized tortoise handler shall prepare a summary report documenting the desert tortoise protection measures implemented. The summary report shall be submitted to the BLM. ▸ 4.1.5-42: Pipeline placement design outside of tortoise-proof fenced project boundaries shall allow for the unimpeded movement of tortoises and other small terrestrial wildlife species. ▸ 4.1.5-43: That portion of the transmission line corridor extending outside of the fenced Project mine and process area boundary shall be re-surveyed for desert tortoise burrows and pallets within fourteen (14) days preceding line upgrading/construction. Tortoise burrows and pallets encountered within the construction zone (if any) shall be conspicuously flagged by the surveying biologist(s) and avoided during power pole placement or existing line upgrading. Contingent upon the findings of the pre-survey for the transmission line upgrade/construction, a determination shall be made by the BLM as to whether or not on-site desert tortoise monitoring would be required during the transmission line upgrade/construction activities. ▸ 4.1.5-44: Transmission and distribution pole design shall prevent nesting or perching by ravens, a major predator of young desert tortoises (see also Mitigation Measure 4.1.5-54). ▸ 4.1.5-45: As an alternative to the use of speed bumps, notification signs for the desert tortoise and speed limit signs shall be placed and maintained within the Project boundary by Applicant to reduce chances for inadvertent vehicle-induced injury or mortality to desert tortoises and other wildlife species. Applicant, with concurrence of County, shall also place these signs along Indian Pass Road leading to the Project mine and process area. ▸ 4.1.5-46: Applicant shall participate in the BLM desert tortoise program for acquiring offsetting lands in compensation for adverse modification of desert tortoise habitat. Under the BLM policy, undesignated lands such as the Project area, where tortoises or tortoise sign are located, become Class III tortoise habitat. Within Class III habitat, an offsetting ratio of 1:1 (e.g., one (1) acre of land secured and protectively managed for each acre affected) is applied. Lands shall be first considered in the affected County and would include 87 acres of habitat within microphyll woodland. ▸ 4.1.5-47: For any well field changes or drilling activities subsequently proposed for the Project, Applicant shall comply with the relevant terms and conditions of the *Biological Opinion for Small Mining and Exploration Operations in the California Desert*, dated June 1, 1992, prepared with respect to desert tortoise by the USFWS, and amended as necessary to be consistent with the desert tortoise protection measures prescribed in the USFWS Biological Opinion for the Project.
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
BIOLOGICAL RESOURCES (continued)			
Impacts to listed species (continued)			
Not significant	Not significant	Not significant	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	**CULTURAL AND PALEONTOLOGICAL RESOURCES**
Issue:	**Disturbance or destruction of cultural resource sites or features determined eligible for the National Register of Historic Places**
Measures Incorporated by Project Design or Regulation:	• 4.1.6-1: To reduce Project impacts on identified cultural resources, Project facilities associated with the Project mine and process area shall be located consistent with those presented in the Plan of Operations (Revised September 1997). This shall include all of the Project revisions included since the previous Plan of Operation (Revised October 1996), including the revised boundary of the Project mine and process area, the reduction in the height of the waste rock stockpiles, the elimination of one (1) waste rock stockpile and two (2) soil stockpiles, and the reconfiguration of the remaining waste rock stockpiles, soil stockpiles, haul roads, and the heap leach pad.
Resulting Impact:	Numerous prehistoric cultural resources determined eligible for the NRHP under criterion "A," "B," "C" and/or "D" would be subject to either direct or indirect impacts from the Project
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	• 4.1.6-2: Applicant shall designate a project contact representative (PCR) who would be responsible for overseeing Project compliance with the conditions and stipulations for cultural resources. The PCR shall have authority to halt all activities that are in violation of the stipulations. The PCR may be a project manager, company environmental coordinator, or other person identified as responsible by the Applicant. Applicant shall provide the name and contact information of the PCR to the BLM prior to construction. • 4.1.6-3: Should previously unidentified cultural resources be discovered during project construction or operations, Applicant shall immediately cease all activities in the immediate vicinity of the discovery and notify the BLM. Activities shall not be reinitiated in the vicinity of the discovery until authorized by the BLM.
Level of Significance after Mitigation:	Significant unavoidable for sites determined eligible for the National Register of Historic Places (NRHP) under criterion "A," "B" and/or "C," and Not significant under criterion "D."
Issue:	**Physical disturbance within the Project mine and process area to the features of religious-symbolic significance within the Indian Pass-Running Man ATCC**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Physical disturbance within the Project mine and process area which will affect to the features of religious-symbolic significance within the Indian Pass-Running Man ATCC
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* • 4.1.6-4: Extant cultural features in the Indian Pass-Running Man ATCC should be avoided to the extent possible. KEA's GPS data base should be provided to Glamis Imperial to determine whether additional features can be avoided. • 4.1.6-5: A professional archaeologist should flag or fence avoided features near construction areas prior to initial site preparation. Environmental inspectors should monitor avoidance. Flags outside of the perimeter fence should be removed immediately after construction of that fence. • 4.1.6-6: An archaeological data recovery program conforming to that recommended in Chapter 9 of the KEA report should be implemented and should include a description and analysis of the features and artifacts that would be destroyed by the project and a technical archaeological report.
Level of Significance after Mitigation:	Significant unavoidable

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
CULTURAL AND PALEONTOLOGICAL RESOURCES			
Disturbance or destruction of cultural resource sites or features determined eligible for the National Register of Historic Places			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although slightly fewer features and sites would be affected	Same as Proposed Action, although substantially fewer features and sites would be affected	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant unavoidable for sites determined eligible for the NRHP under criterion "A," "B" and/or "C," and Not significant under criterion "D."	Significant unavoidable for sites determined eligible for the NRHP under criterion "A," "B" and/or "C," and Not significant under criterion "D."	Significant unavoidable for sites determined eligible for the NRHP under criterion "A," "B" and/or "C," and Not significant under criterion "D."	Not significant
Physical disturbance within the Project mine and process area to the features of religious-symbolic significance within the Indian Pass-Running Man ATCC			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although slightly fewer features and sites would be affected	Same as Proposed Action, although substantially fewer features and sites would be affected	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant unavoidable	Significant unavoidable	Significant unavoidable	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Issue:	**Physical disturbance within the Project mine and process area to significant Native American trails**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Physical disturbance within the Project mine and process area will occur to significant Native American trails and will cut-off the ability of the Quechan to travel physically and spiritually along the Trail of Dreams
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* ▸ 4.1.6-7: In consultation with the Quechan, extant trails in the Indian Pass-Running Man ATCC should be field mapped and their significance to Native Americans ascertained. Low-level aerial photography and video photography should be used to document trails that will be destroyed. It appears from present information that certain trail corridors through the Indian Pass-Running Man ATCC west of the mine and process area can be preserved, including routes to *Avikwaame*. Preserved segments with high Native American sensitivity should be nominated to the NRHP and a preservation plan prepared and adopted by the BLM.
Level of Significance after Mitigation:	Significant unavoidable
Issue:	**Physical disturbance and visual and aural intrusions in and from the Project mine and process area into the Indian Pass-Running Man ATCC**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Physical disturbance and visual and aural intrusions in and from the Project mine and process area into the Indian Pass-Running Man ATCC will conflict with the Quechan traditional practices and inhibit the Quechan's ability to conduct traditional religious activities at the Indian Pass-Running Man ATCC
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* ▸ 4.1.6-8: In accordance with the current Plan of Operations, the height of the waste rock stockpiles and heap should be restricted to 300 feet. ▸ 4.1.6-9: The BLM should continue consultation with the Quechan to ensure continued access to the Indian Pass-Running Man ATCC during Project implementation and after Project closure.
Level of Significance after Mitigation:	Significant unavoidable

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
Physical disturbance within the Project mine and process area to significant Native American trails			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although slightly fewer features and sites would be affected	Same as Proposed Action, although substantially fewer features and sites would be affected	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant unavoidable	Significant unavoidable	Significant unavoidable	Not significant
Physical disturbance and visual and aural intrusions in and from the Project mine and process area into the Indian Pass-Running Man ATCC			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although slightly fewer features and sites would be affected	Same as Proposed Action, although substantially fewer features and sites would be affected	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant unavoidable	Significant unavoidable	Significant unavoidable	Not significant

PROPOSED ACTION

Issue:	**Disturbance created within the Project mine and process area could inhibit or destroy the Quechan's ability to use the Indian Pass-Running Man ATCC for traditional cultural education programs**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Disturbance created within the Project mine and process area will inhibit or destroy the Quechan's ability to use the Indian Pass-Running Man ATCC for traditional cultural education programs
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* ▸ 4.1.6-10: Provide for a cultural educational program which would include a professional-quality video documentary of the Indian Pass-Running Man ATCC prior to disturbance; a full or part-time teaching/curatorial position for a Quechan tribal member for a period of three (3) to five (5) years; preconstruction cultural educational classes in the Indian Pass-Running Man ATCC; and a comprehensive report documenting Quechan history and prehistory written in part or in its entirety by the Quechan. ▸ 4.1.6-11: Delay or phase construction activities to allow the Quechan the opportunity to conduct traditional cultural education in the Indian Pass-Running Man ATCC prior to their loss of this resource. ▸ 4.1.6-12: A non-technical report should be written based on the archaeological and ethnographic studies written for the Quechan tribe, addressing the part of Quechan history that would be destroyed by the mine. ▸ 4.1.6-13: Provide for the expansion of the Quechan Museum and curation of artifacts from the Project in this facility.
Level of Significance after Mitigation:	Significant unavoidable
Issue:	**Disturbance created within the Project mine and process area may have a cumulative effect**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Disturbance created within the Project mine and process area will have a cumulative effect on traditional cultural sites in Quechan territory.
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* ▸ 4.1.6-14: The Indian Pass-Running Man ATCC, the Trail of Dreams, Pilot Knob, Muggins Peak, and the Picacho Basin should be nominated to the NRHP as traditional cultural properties. ▸ 4.1.6-15: A recording and protection program for the concentration of scratched petroglyphs at Indian Pass should be implemented. ▸ 4.1.6-16: Consultation should be initiated with the Quechan to identify a site of traditional concern that could be acquired and protected.
Level of Significance after Mitigation:	Significant unavoidable

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
Disturbance created within the Project mine and process area could inhibit or destroy the Quechan's ability to use the Indian Pass-Running Man ATCC for traditional cultural education programs			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although slightly fewer features and sites would be affected	Same as Proposed Action, although substantially fewer features and sites would be affected	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant unavoidable	Significant unavoidable	Significant unavoidable	Not significant
Disturbance created within the Project mine and process area may have a cumulative effect			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although slightly fewer features and sites would be affected	Same as Proposed Action, although substantially fewer features and sites would be affected	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant unavoidable	Significant unavoidable	Significant unavoidable	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Issue:	**Disturbance created within the Project mine and process area may result in lost data and historic context**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Physical disturbance created by the Project mine and process area to all or parts of seven (7) multicomponent and twelve (12) trail sites will result in data loss and the destruction of historic context
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* ▸ 4.1.6-17: An archaeological data recovery program (in accordance with the recommendations provided in Chapter 9 of KEA's cultural resource report) should be implemented at sites that cannot be avoided.
Level of Significance after Mitigation:	Significant unavoidable
Issue:	**Physical disturbance within the Project ancillary area may affect cultural sites**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Physical disturbance created by construction within the Project ancillary area may result in effects to significant archaeological sites
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* ▸ 4.1.6-18: No ground disturbance should be allowed within features that contribute to the significance of the Indian Pass-Running Man ATCC. In site CA-IMP-2727, the water pipeline should be rerouted to the area already disturbed by Indian Pass Road. Alternatively, boring could be utilized to avoid impacts to contributing features. All NRHP-eligible archaeological sites outside of the Indian Pass-Running Man ATCC should be avoided. Flagging and monitoring should be done in accordance with mitigation measure 4.1.6-5.
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
Disturbance created within the Project mine and process area may result in lost data and historic context			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although slightly fewer features and sites would be affected	Same as Proposed Action, although substantially fewer features and sites would be affected	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant unavoidable	Significant unavoidable	Significant unavoidable	Not significant
Physical disturbance within the Project ancillary area may affect cultural sites			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Essentially the same as Proposed Action	Similar to Proposed Action, although Indian Pass Road would not be relocated	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant

PROPOSED ACTION

Issue:	**Physical disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor may affect historic Camp Pilot Knob**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Physical disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor may affect features that contribute to the NRHP-eligibility of Camp Pilot Knob
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* • 4.1.6-19: Prior to construction, a professional historical archaeologist should flag all features in the vicinity of existing poles that contribute to the NRHP eligibility of Camp Pilot Knob. Periodic archaeological monitoring should be conducted to ensure avoidance. In case of accidental damage, BLM should consult with SHPO regarding an appropriate mitigation program. Oral history and archival research should be considered along with archaeological data recovery in case of such an eventuality. • 4.1.6-20: If adverse effects cannot be avoided, an interpretive display should be developed to supplement the *E Clampus Vitus* sign that already exists on-site. This display should address the relationship of Camp Pilot Knob to the overall Desert Training Center operations and include historical photos of the camp during its period of significance.
Level of Significance after Mitigation:	Not significant
Issue:	**Physical disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor may affect significant archeological sites**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Physical disturbance during construction within the overbuilt 92 kV/34.5 kV transmission line corridor may affect significant archaeological sites
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	*The following mitigation measures were identified by KEA Environmental, Inc. as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the NHPA, and on-going Government-to-Government consultation with the Quechan Tribe:* • 4.1.6-21: All NRHP-eligible sites should be flagged for avoidance of direct impacts prior to construction of the transmission line. Avoidance of flagged archaeological sites should be part of the overall environmental monitoring program for the Project. In addition, periodic monitoring by a professional archaeologist and Quechan representative should be conducted to ensure avoidance. In case of accidental damage, BLM should consult with SHPO regarding an appropriate mitigation program. Oral history archival research, and ethnographic research should be considered as appropriate along with archaeological data recovery in case of such an eventuality.
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
Physical disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor may affect historic Camp Pilot Knob			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
Physical disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor may affect significant archeological sites			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	VISUAL RESOURCES
Issue:	**Lighting**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Project lighting could interfere with low-level military overflight operations using night vision devices (NVD).
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	▸ 4.1.7-4: High intensity lighting used for mining and processing operations at night shall be directed downward to reduce fugitive light. Lighting shall have reflectors or shields to further minimize fugitive light. Light stanchions shall be no higher than necessary for safe and efficient lighting. ▸ 4.1.7-5: Applicant shall establish a working relationship with the U.S. Marine Corps (USMC) to ensure that nighttime lighting of the Project mine and process area does not substantially interfere with the use of Night Vision Devices (NVD) in the vicinity of the Project area or nighttime overflight operations within flight corridor VFR-299. As part of this mitigation measure, Applicant shall provide the USMC Air Station, Yuma, Arizona, with a detailed, to-scale, map of the Project area identifying the principal surface facilities, transmission lines, and locations of potential light sources to enable the USMC to avoid or accommodate these areas during nighttime flight activities.
Level of Significance after Mitigation:	Not significant
Issue:	**Visibility reduction**
Measures Incorporated by Project Design or Regulation:	See Air Resources (measures to reduce the emissions of fugitive dust)
Resulting Impact:	Emissions of fugitive dust and oxides of nitrogen would slightly reduce visibility
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Issue:	**Visual contrast**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.7-1: Following completion of Project mining activities, all buildings, equipment, supplies, and debris shall be removed to improve the visual appearance of the Project area. ▸ 4.1.7-2: Dust suppressants shall be utilized, as necessary and in accordance with ICAPCD permit requirements, on haul roads to minimize fugitive airborne dust generation on the Project mine and process area. ▸ 4.1.7-3: In conformance with the Reclamation Plan as approved by the BLM and Imperial County, all disturbed areas shall be recontoured and reseeded or revegetated with native or indigenous species complementary to vegetation found in the surrounding area.
Resulting Impact:	Unavoidable physical changes in the existing contour and character of the Project area, which would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Proposed Action. These physical changes to the area would be permanent, but would continue to lessen following the completion of final reclamation as natural processes continued to soften the line and form to and match the surrounding landscape. A visual contrast with the surrounding area and change in the existing character of the landscape to a degree which would not conform with the BLM Class II visual objectives which have been applied to this Class L-designated area would also occur.
Level of Significance of Resulting Impact:	Significant and unmitigatable
Mitigation Measures:	None
Level of Significance after Mitigation:	Significant and unmitigatable

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
VISUAL RESOURCES			
Lighting			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
Visibility reduction			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although project emissions would end substantially sooner	Same as Proposed Action, although project emissions would end somewhat sooner	Same as Proposed Action, although highest project emission rates would continue longer	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
Not significant	Not significant	Not significant	Not significant
Visual contrast			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although somewhat reduced	Same as Proposed Action, although slightly reduced	Same as Proposed Action, although substantially reduced	None
Significant and unmitigatable	Significant and unmitigatable	Significant and unmitigatable	Not significant
None	None	None	None
Significant and unmitigatable	Significant and unmitigatable	Significant and unmitigatable	Not significant

PROPOSED ACTION

Resource:	**NOISE**
Issue:	**Production of noise**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.8-1: All heavy equipment, drilling rigs, and other internal combustion engines shall be equipped with mufflers to minimize noise generated during construction, operation and reclamation activities. ▸ 4.1.8-2: Applicable Occupational Safety and Health Administration (OSHA) worker noise protection requirements, as set forth in 29 CFR 1910.95, *et seq*, and California Occupational Safety and Health Administration (Cal-OSHA) requirements, as set forth in 8 CCR 5095, *et seq*, shall be implemented by the Applicant.
Resulting Impact:	Noise from operations would be discernable in the vicinity of the Project mine and process area, but except for blasting would probably be intrusional only to those dispersed recreational users in the immediate area of the Project mine and process area.
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	▸ 4.1.8-3: Blasting shall only be conducted during daylight hours unless required for safety reasons. During the months of October through March, the Applicant shall take all reasonable steps to avoid blasting on weekend days (Saturday and Sunday), and shall not blast on the following major recreational holidays (Thanksgiving [Thursday through Sunday]; Christmas [Christmas day and all associated weekend days]; New Years [New Years eve, New Years day, and all associated weekend days]; and President's Day [and associated weekend days]) unless required for safety reasons or necessary to maintain production due to the mechanical breakdown of production equipment or other unforseen circumstances. Prior to conducting blasting on any of these designated weekend days or major holidays, Applicant shall on that day notify the BLM and take reasonable steps to notify those recreational users of the public lands located along Indian Pass Road or within one (1) mile of the boundary of the Project mine and process area boundary of the approximate time that blasting will occur.
Level of Significance after Mitigation:	Not significant
Resource:	**LAND USE**
Issue:	**Compatibility with existing uses, adopted land use plans and policies, wilderness, and recreation**
Measures Incorporated by Project Design or Regulation:	▸ 4.1.9-1: At the conclusion of mining activities, consistent with the approved Reclamation Plan, Applicant shall recontour all disturbed areas except the pit slopes as appropriate to create undulating land forms that are stable, safe, do not allow for any pooling or ponding, and blend with the surrounding undisturbed topography. Applicant shall also construct a loose rock barricade comprised of large boulders to prevent vehicle access and restrict public entry into the open pit area(s). ▸ 4.1.9-2: Applicant shall conduct mining operations in conformance with the Class L BLM multiple land use guidelines outlined in the CDCA Plan for mining in the area. The Applicant shall also comply with the federal land use requirements prescribed in 43 CFR 3809.
Resulting Impact:	The Proposed Action would generally be compatible with all existing uses and existing plans and policies except the use by low flying military aircraft, and would not produce direct impacts to the nearby wilderness areas. Project operations would likely reduce dispersed recreational uses in the immediate vicinity of the Project mine and process area during the active life of the Project, but with the exception of the open pit, disturbed lands would be available again for dispersed recreation following the completion of final reclamation.
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	▸ 4.1.9-3: Applicant shall keep the USMC air station in Yuma, Arizona apprized of the current schedule and location for blasting at Project mine and process area to minimize the potential for low-flying military aircraft to be over the Project mine and process area during blasting activities.
Level of Significance after Mitigation:	Not significant
Resource:	**SOCIOECONOMICS**
Issue:	**Creation of adverse socioeconomic effects**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	Only positive economic benefits would result.
Level of Significance of Resulting Impact:	Beneficial
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Resource:	**ROADS**
Issue:	**Effects on traffic and public access**

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
NOISE			
Production of noise			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although would occur for only half the time	Same as Proposed Action, although would occur for only two-thirds of the time	Same as Proposed Action	No impact
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
LAND USE			
Compatibility with existing uses, land use plans and policies, wilderness, and recreation			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although effects would be somewhat reduced in area and time	Same as Proposed Action, although effects would be slightly reduced in area and time	Same as Proposed Action	No impact
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
SOCIOECONOMICS			
Creation of adverse socioeconomic effects			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although effects would be somewhat reduced in size and time	Same as Proposed Action, although effects would be slightly reduced in size and time	Same as Proposed Action, although slightly expanded in size and time	No impact
Beneficial	Beneficial	Beneficial	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
ROADS			
Effects on traffic and public access			

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

	PROPOSED ACTION
Measures Incorporated by Project Design or Regulation:	• 4.1.11.1-1: Applicant shall realign an approximate 6,000-foot section of Indian Pass Road around the Project mine and process area prior to surface disturbance which would impede through traffic on this road, and shall maintain Indian Pass Road open to the public during construction of the relocated portion. • 4.1.11.1-2: Applicant shall not route heavy traffic over Hyduke Road. • 4.1.11.1-3: That section of Indian Pass Road realigned prior to mine construction shall be realigned to a location east of and approximately parallel to the diverted West Pit West diversion channel as soon as practicable, but prior to the completion of final reclamation and release of the physical reclamation bond. • 4.1.11.1-4: Applicant shall post warning signs at the two (2) wash crossings along the relocated portion of Indian Pass Road warning drivers not to cross the wash when flooded, and shall undertake repairs or maintenance, as may be necessary and authorized by Imperial County, if Indian Pass Road is damaged by flooding where it crosses these washes. • 4.1.11.1-5: Applicant shall apply water and/or dust suppressants (chemical treatments acceptable to all appropriate agencies) to Indian Pass Road from its intersection with Ogilby Road to the boundary of the Project mine and process area. • 4.1.11.1-6: Applicant shall acquire the necessary approvals of the BLM and Imperial County to construct the relocated section of Indian Pass Road and the realigned intersection of Indian Pass Road and Ogilby Road, and shall design, construct and maintain these facilities in accordance with the permit conditions which are applicable at the time of construction. • 4.1.11.1-7: Applicant shall encourage employees and construction workers to carpool to the Project area. • 4.1.11.1-8: Applicant shall maintain Indian Pass Road from the intersection with Ogilby Road to the point immediately northeast of the Project mine and process area, including the section of the road relocated by the Project, during the active life of the Project in consultation with the Imperial County Public Works Department.
Resulting Impact:	There would a slight increase in traffic on public roads in the vicinity of the Project area over the 20-year life of the Project, and the closure of several currently open "routes" in the immediate vicinity of the Project mine and process area. Indian Pass Road would be temporarily rerouted but maintained open, and may lead to some proliferation of roads.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Other Measures:	• 4.1.11.1-9: To reduce the potential that access and "spur" roads constructed to provide temporary access to the new transmission line, water pipeline, and water wells may continue to be used by the public following the completion of Project reclamation, these roads, when constructed in areas of dark "desert varnished" desert pavement, shall be reclaimed in a manner, such as the application of Permeon, to reduce the visual contrast between the disturbed area and the surrounding undisturbed dark desert pavement.

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although effects would be somewhat reduced in area and time	Same as Proposed Action, although effects would be slightly reduced in area and time	Same as Proposed Action	No impact
Not significant	Not significant	Not significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	UTILITIES
Issue:	Effects on utility services
Measures Incorporated by Project Design or Regulation:	▸ 4.1.11.2-1: Applicant shall make available an on-site, diesel-fuel generator to meet emergency power needs for essential loads and services during periods of utility-provided electrical service interruption. ▸ 4.1.11.2-2: Applicant shall, at the end of the active life of the Project, remove all below-grade structures and all foundations, including the process pond liners; transport all surplus materials, storage containers and trash to a reuse or recycle facility, or to a landfill, authorized to accept this material; remove all remaining non-mining waste products, all surplus fuel oil, and other materials from the Project mine and process area and dispose of them according to then-current state and federal regulations. ▸ 4.1.11.2-3: Applicant shall acquire the necessary approvals of the BLM, Imperial Irrigation District, and other appropriate agencies to construct the 92 kV transmission line over the existing 34.5 kV transmission line, and shall design, construct and maintain this transmission line in accordance with the conditions of these permits, including avoiding the disturbance of any new surface areas during construction.
Resulting Impact:	There would a very slight demand placed on utilities, which would not create capacity which would stimulate new development.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant
Other Measures:	▸ 4.1.11.2-4: Applicant shall work with the USMC to ensure that neither the microwave communication system nor the Project FM mine communication system interfere with military overflight communications.
Resource:	PUBLIC SERVICES
Issue:	Demands on public services
Measures Incorporated by Project Design or Regulation:	▸ 4.1.11.3-1: Applicant shall provide an on-site septic system for wastewater treatment, which shall be removed upon completion of Project activities. ▸ 4.1.11.3-2: When no longer required for Project operations, Applicant shall remove that portion of the 92 kV/13.2 kV transmission line owned by the Project. ▸ 4.1.11.3-3: Applicant shall provide potable water for hand washing and drinking purposes. ▸ 4.1.11.3-4: Applicant shall obtain necessary permit(s) for on-site sanitary facilities from the Imperial County Department of Health Services. ▸ 4.1.11.3-5: To the extent feasible, all GLO/BLM Cadastral Survey monuments shall be avoided and protected from any accidental damage or destruction. All monuments which may be subject to either intentional or accidental damage or destruction within the Project mine and process area shall be perpetuated by the installation and survey of witness monuments, subject to the prior approval of the survey by the BLM Cadastral Survey and conformance with the applicable California codes, and documented with a record of survey.
Resulting Impact:	No demand on public services is anticipated.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
UTILITIES			
Effects on utility services			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action, although effects would be somewhat reduced in time	Same as Proposed Action, although effects would be slightly reduced in time	Same as Proposed Action	No impact
Not significant	Not significant	Not significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant
None	None	None	None
PUBLIC SERVICES			
Demands on public services			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	No impact
Not significant	Not significant	Not significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant

PROPOSED ACTION

Resource:	EMERGENCY SERVICES AND PUBLIC SAFETY
Issue:	**Potential to create public hazards**
Measures Incorporated by Project Design or Regulation:	• 4.1.12-1: Applicant shall provide appropriate levels of on-site security, fire protection services, and emergency first-aid medical services. • 4.1.12-2: Applicant shall construct and maintain a fence around the perimeter of the Project mine and process area over the life of the Project, and a chain-link fence, no less than six (6) feet in height, with one (1) foot of barbed wire at the top, around the ore leach pad, process facilities, to prevent the public from accessing these facilities. • 4.1.12-3: Sodium cyanide shall be shipped to, and received at, the Project mine and process area in solid, briquette from in the manufacturer's dry bulk trucks, and be put into solution directly from the dry bulk trucks at the Project mine and process area process facility. • 4.1.12-4: Before removal of the perimeter fence at the end of the active life of the Project, Applicant shall construct around the rim of the open East Pit a barricade with large boulders to prevent vehicular access and discourage pedestrian access by the public over slopes which could constitute a hazard. The barricade shall consist of boulders averaging approximately four (4) feet in diameter, which shall be stacked into a continuous wall no less than eight (8) feet high. This "wall" shall be set back from the edge of the pit by no less than 100 feet. In addition, the uppermost ten (10) feet of the pit slope shall slope no greater than 2H:1V (30 degrees), and shall terminate at its lower side into a horizontal bench no less than ten (10) feet wide. • 4.1.12-5: Applicant shall post no trespassing and hazardous chemical signs, in both English and Spanish, at strategic locations along perimeter locations of the Project mine and process area perimeter fence and the process facilities barbed wire-topped chain-link fence, respectively. • 4.1.12-6: Applicant shall prepare a hazardous material spill/release contingency plan and provide appropriate training to all Project employees on the proper response to potential chemical releases. • 4.1.12-7: Applicant shall prepare an emergency response contingency plan which provides for actions to be taken in the event of an injury accident, hazardous materials release, fire, flash flooding on Indian Pass Road, or other emergency situation. The emergency response contingency plan shall include emergency phone numbers and services available for both surface and air transport of injured employees. The emergency contingency response plan shall incorporate protocols acceptable to the BLM, ICPWD, and the Imperial County Sheriff's Office for dealing with flash floods and public safety on Indian Pass Road. The protocols shall address notification of agencies and closures of Indian Pass Road. • 4.1.12-8: Applicant shall prepare and maintain a hazardous material business plan in conformance with the requirements of Imperial County. • 4.1.12-9: Applicant shall conform with all applicable safety regulations required by the Mine Safety and Health Administration (MSHA), Occupational Safety and Health Administration (OSHA), and California Occupational Safety and Health Administration (Cal-OSHA).
Resulting Impact:	Should mining be terminated prior to the complete backfilling of either the West Pit or the Singer Pit, these pits would not be barricaded under the Proposed Action.
Level of Significance of Resulting Impact:	Significant
Mitigation Measures:	• 4.1.12-10: Before removal of the perimeter fence at the end of the active life of the Project, Applicant shall construct around the rim of the all open pit(s) a barricade with large boulders to prevent vehicular access and discourage pedestrian access by the public over slopes which could constitute a hazard. The barricade shall consist of boulders averaging approximately four (4) feet in diameter, which shall be stacked into a continuous wall no less than eight (8) feet high. This "wall" shall be set back from the edge of the pit by no less than 100 feet. In addition, the uppermost ten (10) feet of the pit slope shall slope no greater than 2H:1V (30 degrees), and shall terminate at its lower side into a horizontal bench no less than ten (10) feet wide.
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
EMERGENCY SERVICES AND PUBLIC SAFETY			
Potential to create public hazards			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	No impact
Significant	Significant	Significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

PROPOSED ACTION

Resource:	OTHER RESOURCES
Issue:	**Environmental justice**
Measures Incorporated by Project Design or Regulation:	None
Resulting Impact:	No disproportionately high and adverse indirect human health or environmental effects to minority or low-income populations would result.
Level of Significance of Resulting Impact:	Not significant
Mitigation Measures:	None
Level of Significance after Mitigation:	Not significant

Table S.1: Summary of Potential Environmental Effects and Mitigation Measures

WEST PIT ALTERNATIVE	EAST PIT ALTERNATIVE	COMPLETE PIT BACKFILL ALTERNATIVE	NO ACTION ALTERNATIVE
OTHER RESOURCES			
Environmental justice			
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	No impact
Not significant	Not significant	Not significant	Not significant
Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	None
Not significant	Not significant	Not significant	Not significant

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The following Appendix is contained in this Volume I of the Draft EIS/EIR:

The following Appendices are contained in Volume II of the Draft EIS/EIR, which is available for public review at the BLM's El Centro Resource Area Office, the Imperial County Planning/Building Department, and the libraries listed in the front of this document:

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1. INTRODUCTION

1. INTRODUCTION

1.1. Proposed Action Description and Location

Glamis Imperial Corporation (Glamis Imperial) has proposed the development of the Imperial Project (Project), an open-pit, heap-leach, precious metal mine and processing facility located in eastern Imperial County, California. The Project would utilize conventional heap leach mining methods to extract gold and silver from the mined ore (see Chapter 10 for a glossary, list of acronyms, and for definitions of selected terms). The Project would include: mining gold and silver ore and waste rock; constructing and operating facilities to administer the operation and maintain all mining and related equipment; processing the ore and stockpiling the waste rock; developing and producing ground water for use in processing operations and dust control; constructing an electric transmission line to provide electrical power for the operations; conducting geological survey activities; implementing environmental impact reduction measures; and implementing reclamation measures.

In addition to the Project activities described above, an existing electric transmission line would be overbuilt to allow the transmission of the electrical energy necessary for the Project. Together, all of these activities constitute the "Proposed Action."

Up to 150 million tons of ore would be mined and deposited on the leach pad where the precious metals would be leached. Up to 300 million tons of waste rock would be mined and deposited in the waste rock stockpiles or the mined-out portions of the two (2) of the open pits. Mining activities would be performed 24 hours per day, seven (7) days per week. The daily mining rate would typically be 130,000 tons per day, and range between zero (0) and 200,000 tons per day. Operations would commence in 1998, after the acquisition of all required approvals, and would terminate in approximately the year 2017, although reclamation activities may continue beyond that date.

The Project is located in eastern Imperial County, California, approximately 45 miles northeast of El Centro, California and 20 miles northwest of Yuma, Arizona (Figure 1.1). The Project area is located within Sections 31, 32 and 33, Township 13 South, Range 21 East, and Sections 4, 5, 6, 7, and 8, Township 14 South, Range 21 East, San Bernardino Baseline & Meridian (SBB&M), entirely on public lands administered by the U.S. Bureau of Land Management (BLM). As discussed throughout this document, the "Project area" consists of a "Project mine and process area" and a "Project ancillary area." The "Project mine and process area" would contain all of the open pits, waste rock stockpiles, soil stockpiles, stream diversion channels, administration office and maintenance facility area, heap leach facility, precious metal recovery plant and other facilities, an electric substation, and internal roads and electrical distribution lines. The boundary of the Project mine and process area is shown in Figure 1.2. The "Project ancillary area" would include ground water production wells and buried water pipeline, a new 92 kV/13.2 kV transmission line, and relocated portions of Indian Pass Road. The boundary of the Project ancillary area is also shown on Figure 1.2.

In addition to the "Project area," the "overbuilt 92 kV/34.5 kV transmission line corridor" would contain all of the activities associated with the "overbuilding" of the utility-owned 34.5 kV transmission line into an overbuilt 92 kV/34.5 kV transmission line. Figure 1.2 also shows the location of the overbuilt 92 kV/34.5 kV transmission line corridor.

Access to the Project area is from Ogilby Road via Interstate Highway 8 from the south, or from State Route 78 to the north (see Figure 1.2). The Project mine and process area overlaps Imperial County-maintained Indian Pass Road, and is located approximately five (5) miles northeast of the Indian Pass Road/Ogilby Road intersection.

The Project mine and process area boundary encompasses approximately 1,571 acres on a broad, south- and west-facing, alluvial plain south of Indian Pass in the Chocolate Mountains, between the Cargo Muchacho Mountains, approximately four (4) miles south, and Peter Kane Mountain, approximately six (6) miles north. The elevation over the Project mine and process area ranges from about 760 feet to 925 feet. The Project mine and process area lies near the center of the mining district formed by the active Picacho Mine, Mesquite Mine, and American Girl Mine heap leach gold facilities, each located approximately 10 miles from the Project mine and process area (see Figure 1.2).

Glamis Imperial Corporation, a Nevada Corporation with a mailing address of P.O. Box 1177, Winterhaven, California 92283, is a wholly owned subsidiary of Glamis Gold, Inc., a Nevada Corporation with its corporate headquarters at 5190 Neil Road, Suite 310, Reno, Nevada 89502. Glamis Gold, Inc. is a wholly owned subsidiary of Glamis Gold Ltd., a corporation incorporated under the laws of the Province of British Columbia, Canada with its offices located at 3324 Four Bentall Centre, 1055 Dunsmuir Street, Vancouver, British Columbia, Canada V7X1A1. Glamis Gold Ltd. is a publicly traded company on the New York and Toronto Stock Exchanges. Glamis Imperial Corporation has two (2) sister companies operating gold mines in the United States. They are Chemgold, Inc., which operates the Picacho Mine in Imperial County, California, and Rand Mining Company, which operates the Rand Mine in Kern County, California. Glamis Imperial Corporation was formed specifically to be the operating company for the Imperial Project, and replaces Chemgold, which originally proposed the Project.

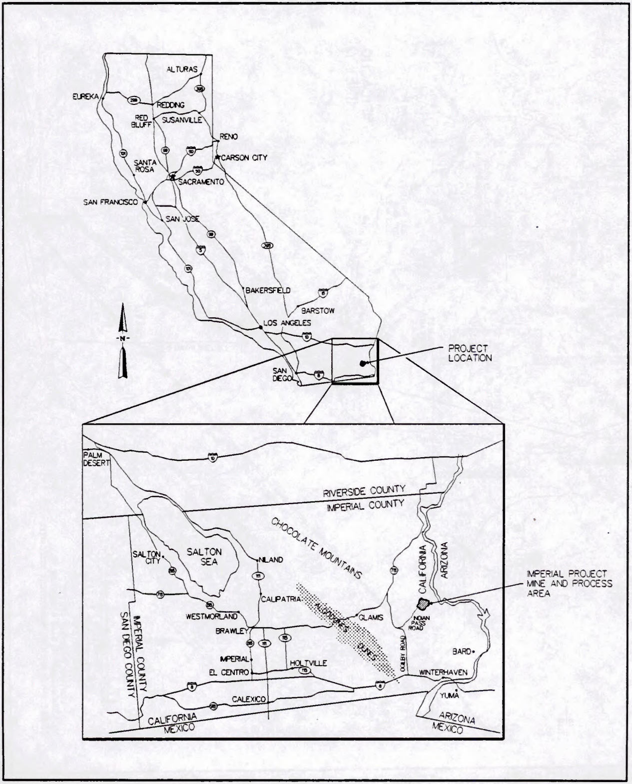

Figure 1.1: Imperial Project General Location Map

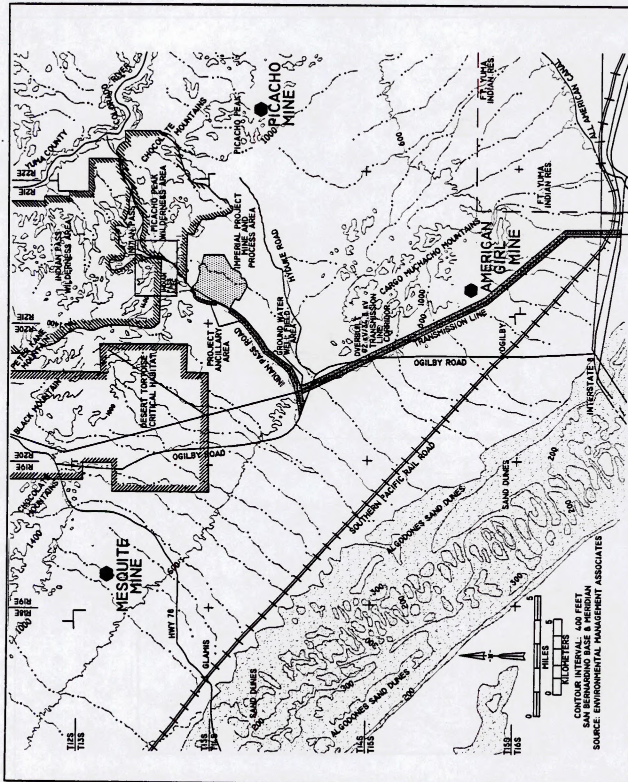

Figure 1.2: Imperial Project Vicinity Map

1.2. Intended Uses of this EIS/EIR

This Draft Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR) has been jointly prepared by the U.S. Bureau of Land Management (BLM), which is the Lead Agency with respect to compliance with the National Environmental Policy Act (NEPA) and its implementing regulations, and Imperial County, acting through the Imperial County Planning/Building Department (ICPBD), which is the Lead Agency responsible for compliance with the California Environmental Quality Act (CEQA) and its applicable regulations, to analyze the environmental effects of the Proposed Action, which consists of the Imperial Project, an open-pit, heap-leach, precious metal mine proposed by Glamis Imperial Corporation, and the "overbuilding" of an existing utility electrical transmission line to deliver the necessary electrical power to the Imperial Project (see Section 2.1.1 for additional information regarding the Proposed Action).

The purpose of this joint EIS/EIR is to inform decision-makers in all agencies required to approve authorizing actions (see Section 1.8) and the public generally regarding: the anticipated significant environmental effects of the Proposed Action; the possible ways to mitigate these significant effects of the Proposed Action; and reasonable alternatives which could feasibly reduce those identified significant environmental impacts of the Proposed Action to below the level of significance. The information in an EIS or EIR does not control an agency's discretion on a project. However, under CEQA (Public Resources Code Section 21002.1), the state or local agency must adopt feasible mitigation measures or alternatives within its jurisdiction if they would avoid significant environmental effects identified for the Proposed Action.

This Draft EIS/EIR has been prepared as two (2) separate volumes, which together comprise the entire document. Volume I contains the Summary, the Table of Contents, Chapters 1 through 11, and Appendix A of the Draft EIS/EIR, the Imperial Project Reclamation Plan (including several attachments to the Reclamation Plan). Volume II contains Appendices B through O of the Draft EIS/EIR. Both Volumes of this Draft EIS/EIR are available for public review at the BLM's El Centro Resource Area Office, the Imperial County Planning/Building Department, and the libraries listed in the front of this volume of the Draft EIS/EIR.

1.3. Prior EIS/EIR Documentation

The BLM published a Notice of Intent (NOI) to prepare an EIS for the Imperial Project in the Federal Register on March 24, 1995, and Imperial County distributed a Notice of Preparation (NOP) of an EIR for the Imperial Project on April 5, 1995. A Draft EIS/EIR, dated November 1996, was distributed and the comment period, which included two (2) public hearings, ended on March 24, 1997. After a review of the comments received, on June 11, 1997 the BLM and ICPBD jointly announced that a new Draft EIS/EIR for the Imperial Project would be prepared and circulated. Over 600 copies of the press release of this announcement were distributed by mail, including one to each party which received and/or commented on the November, 1996 Draft EIS/EIR. The announcement stated that the new Draft EIS/EIR would incorporate new information and address the concerns

identified by the comments received during the public comment period on the November, 1996 Draft EIS/EIR. A copy of this Press Release is included in Appendix B.

On August 1, 1997, the BLM published in the Federal Register a Notice of Withdrawal of the November, 1996 Draft EIS for the Imperial Project and Notice of Intent to Prepare an EIS for the Imperial Project. This notice stated that although the November, 1996 Draft EIS/EIR was being withdrawn, all comments received on this document would be treated as scoping comments for the revised Draft EIS. New written scoping comments were also solicited by this notice, which stated that scoping comments could be submitted to the BLM through September 2, 1997. Approximately 600 copies of this notice were also distributed by mail, including one to each party which either received, or commented on, the November, 1996 Draft EIS/EIR. A copy of the Notice of Withdrawal and Notice of Intent to Prepare an EIS, and the letter and copy of the notice which were distributed by mail, are included in Appendix B.

The ICPBD determined that the Draft EIR would be revised and recirculated pursuant to Public Resources Code Section 21092.1 and Title 14, Code of California Regulations, Section 15088.5.

1.4. Scoping Using Previous Comments

During the comment period for the November, 1996 Draft EIS/EIR, a total of over 425 written comment letters were received by either the BLM or ICPBD regarding the Proposed Action and the November, 1996 Draft EIS/EIR. In addition, 49 people spoke at the two (2) public hearings. Copies of all of the written comments received, and transcripts of all of the verbal comments given during the public hearings, on the November, 1996 Draft EIS/EIR are on file with the BLM and the ICPBD, and may be viewed during normal business hours at the locations listed below:

Bureau of Land Management	Imperial County
El Centro Resource Area	Planning/Building Department
1661 South Fourth Street	939 Main Street
El Centro, California 92243	El Centro, California 92243
(760) 337-4400	(760) 339-4236
7:45 am to 4:30 pm	7:00 am to 12:00 noon - 1:00 pm to 5:00 pm

A summary of the principal issues of public and agency concern expressed in these comments, organized by resource or general topical area, are presented in Table 1.1. In addition, Table 1.1 also summarizes how this Draft EIS/EIR differs from the November 1996 Draft EIS/EIR in response to each of these primary issues of public and agency concern.

Table 1.1: Summary of Principal Issues of Concern Identified in Comments on the November 1996 Draft EIS/EIR

Summary of Principal Issues of Concern Identified in Comments on the November 1996 Draft EIS/EIR
TOPIC
General
• BLM policy and requirements in relationship to the 1872 Mining Act (Introduction has been revised and expanded)
Proposed Action
• Request for pit slope stability analyses (completed by third-party consultant, and would be reviewed and revised after first year of mining)
• Need additional figure to show topographic scale of project in relation to larger area (requested map, and aerial photograph, added)
• Proposed liner system appears inadequate (additional information added about liners being adequate as designed)
Reclamation
• Reclamation Plan needs to be more specific and provide more detail (Reclamation Plan completely revised to provide more details regarding seed mix, transects and test plots, etc.)
• Reclamation bond is insufficient (reclamation bond amounts for both chemical and physical reclamation recalculated and increased)
• Criteria for revegetation success are confusing and too low (Glamis Imperial has revised to clarify, and revegetation success criteria have been raised)
Surface Waters
• Clarify relationship of Project to FEMA flood hazard map (requested analysis added)
• Identify and discuss effects of ground water production on seeps in the region (requested information and analysis added)
• Delineation of "waters of the United States" is incorrect (a new delineation has been completed)
Ground Waters
• Clarify relationship of pumped ground waters to the Colorado River aquifer (substantial clarification added)
• Identify and discuss effects of ground water production on shallow ground water wells in the region (requested information and analysis added)
• Reduce estimated quantity of water seeping from All American Canal to Amos-Ogilby-East Mesa Basin (estimates changed, with additional analysis added)
• Add discussion of Imperial County's Ground Water Management Ordinance and requirement for permit (requested information added)
• Concern that the ground waters flow into the Picacho Wash Basin from the Project mine and process area (additional information added)
Air Resources
• Request to recalculate fugitive emissions for travel on unpaved roads (requested change made, and other revisions to reflect changes in the Proposed Action)
• Additional cumulative analysis for air quality requested (cumulative analysis extended)
Vegetation
• Compensation for microphyll woodland should be 3:1, not 1:1 (incorporated into Proposed Action by Glamis Imperial)
• The effects of dust settling on vegetation needs to be added (analysis conducted and added)
Wildlife/ Habitat
• Request to conduct a survey for bats (survey of the Project mine and process area completed with none found)
• Request to compensate for impacts to flat-tailed horned lizards (survey of the southernmost end of the overbuilt transmission line corridor completed with none found)
• Analysis of bighorn sheep and deer impacts should be expanded (additional analysis added)

Summary of Principal Issues of Concern Identified in Comments on the November 1996 Draft EIS/EIR
TOPIC
• Discussion regarding lighting effects on wildlife needed (discussion regarding lighting added to Proposed Action and Environmental Consequences Chapters)
Recreation/Wilderness
• Analysis of impact to recreation resources and wilderness needs to be expanded (additional information added to Affected Environment and Environmental Consequence Chapters)
Cultural/ Native American Issues
• Consultation with Native Americans must be undertaken and completed (consultation process has been ongoing and is summarized in EIS/EIR)
• Cultural resource assessment and analysis is incomplete and insufficient (intensive new survey of all potential areas of disturbance conducted with Native American participation)
Visual
• Reduce the height of the waste rock stockpile and remove "stair steps" by rounding edges (incorporated by Glamis Imperial into Proposed Action)
• Better analysis of visual impacts needed, including additional Key Observation Points (A fourth Key Observation Point is added; visual simulations revised; and an additional set of simulations completed to show views both before and after completion of final reclamation)
Emergency Preparedness/ Public Safety
• Assessment of impacts of transportation of liquid cyanide inadequate (transportation of liquid cyanide removed from Proposed Action by Glamis Imperial)

1.5. Scoping and Consultation Process

During the current public scoping period, fifteen (15) written scoping comment letters were received by the BLM. A summary of the primary issues of public and agency concern expressed in these scoping comments, organized by resource or general topical area, together with a count of the number of comments received regarding each general resource or topical area, are presented in Table 1.2. Subsequent to the close of the public scoping period, additional were received by the BLM and the ICPBD. These additional letters were reviewed and determined to not contain any information not previously identified in other scoping comments or addressed in the EIS/EIR. A copy of all of the letters received subsequent to the commencement of the public scoping period in response to the NOI and public notices are on file with the BLM and the ICPBD, and may be viewed during normal business hours at the offices of the BLM and ICPBD listed above.

Table 1.2: Summary of Issues Identified in Scoping Comment Letters Submitted in 1997

Topic	Number
General Statements	11
• 1872 Mining Act gives public lands away; mining on public lands should cost as much as mining on private land	
• The Proposed Action is bad, would lower the quality of life, and disturbs too much land	
• Chemgold/Glamis have demonstrated capability in mine operations and are good stewards of the environment	
• Use previous comments and ensure that commentor is on the list for all future mailings	
• Please hold further hearings on this project	
• All comment letters and public meeting transcripts on the November 1996 Draft EIS/EIR should be included as an appendix to the new EIS/EIR; they should also be made available to the public in convenient locations	
Reclamation	2
• The land must be returned to pre-mining conditions when mining ceases, and a qualified third-party should perform monitoring	
• There is no plan to restore the plant life after mining is done	
Ground Water	5
• Ground water production wells would deplete the ground water table	
• Ground water quality monitoring must be in place during and after mining operations	
• Bonding must be in place for the costs of mitigating any possible ground water contamination	
• Sluice water would contaminate ground water, including Yuma potable water supply	
• Even if pits are refilled with waste rock, bad things like cyanide would still be below the ground water table	
Air Resources	1
• What would be particulate levels in the air due to open pit mining	
Wildlife/ Habitat	1
• The Proposed Action would still disturb 1,409 acres of natural habitat	
Cultural/ Native American Issues	2
• It would not be possible for the mine to be built and avoid the many archaeological and religious features which are protected by law	
• The Proposed Action would destroy a vital and uninterrupted cultural district; no mitigation other than preservation would be conscionable	
Visual	3
• Complete Visual Contrast Rating Worksheets(VCRWs) must be included in the EIS/EIR	
• VCRWs for more than 3 Key Observation Points (KOPs) must be completed	
• Additional KOPs should be located closer to the Project and in the adjacent wilderness areas	
Land Use	2
• Deserts and open spaces are public lands that should be used for the public good, not for mining which is not needed	
• The Proposed Action is located 0.5 mile from land protected by the California Desert Protection Act	
Socioeconomics	2
• There should be no tax subsidy during or after operations to clean up or mitigate toxic contamination	
• Include a detailed analysis of the financial health of Glamis Imperial to undertake and complete the Proposed Action	
Cumulative Effects	2
• Analysis needs to be expanded to include cumulative impacts of a fourth gold mine in southeastern Imperial County	
• More emphasis needs to be placed on cumulative air quality impacts in light of letters of concern from Gold Rock Ranch area residents	

The scope of the environmental issues addressed in this Draft EIS/EIR has been identified based on all of the previous public and agency comments and consultations described above. In addition, after the release of the November, 1996 Draft EIS/EIR, Glamis Imperial made several revisions to the Proposed Action, many in response to environmental issues identified during the comment period on the November, 1996 Draft EIS/EIR. Table 1.3 lists the principal revisions to the Proposed Action made by Glamis Imperial since the November, 1996 Draft EIS/EIR was released. Glamis Imperial has also committed to a number of additional environmental impact reduction or compensation measures which were not contained in the November, 1996 Draft EIS/EIR; these are listed in Section 2.1.12.

1.6. Principal Agency Policies and Authorizing Actions

The Proposed Action proposes certain land uses to be located on public lands administered by the BLM. These land uses are reviewed by the BLM under the applicable federal land use regulations (43 CFR 3809 and 43 CFR 2800, etc.), and the entirety of the Proposed Action is reviewed under NEPA through the preparation of an EIS (or, in this case, a single, joint NEPA EIS/CEQA EIR), prior to any BLM decision on approval. Review and possible approval of the Reclamation Plan (under 43 CFR 3809) is a part of this process, and play a role in the determination of the BLM as to whether the Project would cause "unnecessary or undue degradation of the federal lands" and whether there has been sufficient provision for "reasonable reclamation." The EIS is used by the BLM in making these determinations, and in issuing a Record of Decision for the project under NEPA. Other federal agencies issuing authorizations required for the Proposed Action must also consider the information provided in the EIS in their decision-making processes.

Because the Proposed Action is located on public lands administered by the BLM, the Project activities which require Imperial County's approval or authorization (Reclamation Plan; Conditional Use Permit for water well drilling and production; road abandonment, right-of-way acceptance, and encroachment, etc.) are not land use authorizations, but approvals of activities which either directly affect County operations or place environmental controls on land uses. Under CEQA, the County must make the required findings under the CEQA Guidelines (14 CCR Section 15091) and issue any approval in conformance with 14 CCR 15092. Further, as the lead agency under CEQA, the County is required to prepare an EIR (or, in this case, a single, joint NEPA EIS/CEQA EIR) which reviews the environmental effects of the Proposed Action and to certify that the EIR was completed in compliance with CEQA. The certified EIR is also used by the other local and state agencies issuing discretionary approvals for the Proposed Action (as set forth in Section 1.8 and Table 1.4.), which must still consider the information in the EIR in reaching their own conclusions on whether or how to approve those portions of the Proposed Action over which they have jurisdiction.

Table 1.3: Principal Revisions to the Proposed Action Including Reclamation Plan

Revisions to Proposed Facilities or Operations:
• Reduction of the mass of waste rock to be mined to 300 million tons from 450 million tons as a result of additional geologic information.
• Reduction of the number of waste rock stockpiles from three (3) to two (2).
• Reduction of the height of the South Waste Rock stockpile to 300 from 400 feet above ground level.
• Reduction of the number of soil stockpiles to two (2) from four (4) through consolidation, and relocation of the remaining soil stockpiles to reduce the possibility of stream erosion.
• Reconfiguration of the Project mine and process area boundary, heap leach pad, waste rock stockpiles, and haul roads to avoid direct effects to some of the prehistoric cultural features within the Project mine and process area.
• Reduction in the total surface disturbance resulting from the Proposed Action from 1,413 acres to 1,362 acres.
• Increasing the thickness of the heap leach pad liner and process pond liner.
• Elimination of the transportation of liquid cyanide.
• Increase in the number of ephemeral wash diversion channels from four (4) to five (5).
• Design of all drainage diversions to control the 6-hour, 100-year; 24-hour, 100-year; and 24-hour,500-year storm events.
• Clarification that the Singer Pit would be backfilled.
• Elimination of the Mineral Potential Area and any mining in this area under this Proposed Action.
• Reduction in the amount of disturbed microphyll woodland within Project mine and process area from 100 to 87 acres.
• Acquisition of off-site private lands with comparable microphyll woodland habitat to compensate at a 3:1 ratio for all microphyll woodland directly impacted by the Proposed Action.
• Developing an Memorandum of Agreement with the BLM to reclaim lands disturbed by others at a 1:1 ratio for the 165 acres of East Pit slopes not reclaimed under the Proposed Action.
• Agreement to purchase of off-site tortoise mitigation land within designated critical habitat at a 1:1 ratio for all lands disturbed or removed from tortoise habitat by fencing.
• Preparation of third-party pit slope stability analyses and agreement to reanalyze slope stability after first year of mining in the West Pit and East Pit.
• Preparation of third-party hydrologic/hydraulic analyses for the East Pit and West Pit diversion ditches.
• Agreement to purchase and install three (3) wildlife guzzlers off-site in the general vicinity of the Project Area.
Revisions to the Project Reclamation Plan:
• Clarification of reclamation goals.
• Regrading of all disturbed areas within the Project mine and process area to round off sharp edges, remove "stair steps," and alter straight lines to create undulating land forms that blend with the surrounding topography.
• Removal of all below-grade structures and foundations from the Project mine and process area.
• Revegetating all disturbed areas within the Project mine and process area except the 165 acres of the slopes of the open East Pit.
• Higher reclamation revegetation standards.
• Higher physical and chemical reclamation bonding amounts.

1.6.1. Bureau of Land Management

This EIS/EIR was prepared in conformance with the policy guidance provided in BLM's National Environmental Policy Act (NEPA) Handbook (BLM Handbook H-1790-1). The handbook provides instructions for compliance with the Council on Environmental Quality's (CEQ's) regulations (40 CFR 1500-1508) for implementing the procedural provisions of NEPA (Public Law 91-90, 42 USC 4321 *et seq.*) and the Department of Interior's manual guidance on NEPA (516 DM 1-7).

<u>Surface Management Authorizations and Relevant Plans</u>:

Federal policy supports maintaining a viable domestic mining industry, and encourage private parties to identify and develop economic domestic mineral resources. The General Mining Law of 1872 (30 USC 22 *et seq.*)[1872 Mining Act] opened public lands to exploration and development of mineral resources, granting a person who discovers valuable mineral deposits the right to extract and sell these minerals. This policy was reaffirmed in the Mining and Minerals Policy Act of 1970, which stated that an "economically sound" mining industry was important for both economic and national security reasons, and in the National Materials and Minerals Policy, Research and Development Act of 1980, which noted the need to encourage mineral exploration.

Section 302 of the Federal Land Policy and Management Act of 1976 (FLPMA) and BLM regulations for surface management of public land being mined under the general mining law (43 CFR 3809) recognize the statutory right of mineral claim holders such as Glamis Imperial to explore for, and develop, federal mineral resources, and encourages such development. These regulations state, in part:

> (43 CFR 3809.0-6) "Consistent with section 2 of the Mining and Mineral Policy Act of 1970 and section 102(a)(7), (8), and (12) of the Federal Land Policy and Management Act, it is the policy of the Department of the Interior to encourage the development of Federal mineral resources and reclamation of disturbed lands. Under the mining laws a person has a statutory right, consistent with Departmental regulations, to go upon the open (unappropriated and unreserved) Federal lands for the purpose of mineral prospecting, exploration, development, extraction and other uses reasonably incident thereto. This statutory right carries with it the responsibility to assure that operations include adequate and responsible measures to prevent unnecessary or undue degradation of the Federal lands and to provide for reasonable reclamation."

The following definitions are also provided in these regulations:

> (43 CFR 3809.0-5(h)) "*Person* means any citizen of the United States or person who has declared the intention to become such and includes any individual, partnership, corporation, association, or other legal entity."

(43 CFR 3809.05(j)) "*Reclamation* means taking such reasonable measures as will prevent unnecessary or undue degradation of the Federal lands, including reshaping land disturbed by operations to an appropriate contour and, where necessary, revegetating disturbed areas so as to provide a diverse vegetative cover. Reclamation may not be required where the retention of a stable highwall or other mine workings is needed to preserve evidence of mineralization."

(43 CFR 3809.05(k) "*Unnecessary or undue degradation* means surface disturbance greater than what would normally result when an activity is being accomplished by a prudent operator in usual, customary, and proficient operations of similar character and taking into consideration the effects of operations on other resources and land uses, including those resources used outside the area of operations. Failure to initiate and complete reasonable mitigation measures, including reclamation of disturbed areas or creation of a nuisance, may constitute unnecessary or undue degradation. Failure to comply with applicable environmental protection statutes and regulations thereunder will constitute unnecessary or undue degradation. Where specific statutory authority requires the attainment of a stated level of protection or reclamation, such as in the California Desert Conservation Area, Wild and Scenic Rivers, areas designated as part of the National Wilderness System administered by the Bureau of Land Management and other such areas, that level of protection shall be met."

Thus, these federal regulations require the BLM to review proposed operations to ensure that: (1) adequate provisions are included to prevent unnecessary or undue degradation of public lands; (2) measures are included to provide for reasonable reclamation; and (3) the proposed operations comply with other applicable federal, state and local laws and regulations. Glamis Imperial, as a corporation formed under the laws of the state of Nevada, is a "person" qualified to hold and develop these mining claims under 43 CFR 3908 regulations. Glamis Imperial has also submitted to the BLM a proposed Plan of Operations (POO) as required under these regulations.

The Proposed Action would be located within the California Desert Conservation Area (CDCA), which has been identified by Congress in the Federal Land Policy and Management Act of 1976 (FLPMA) as a unique area in need of special management by the BLM. Use of the lands and natural resources within the CDCA are guided by the 1980 CDCA Plan (as amended). All of the Project facilities would be located within multiple use Class L - Limited Use, which is the second-most restrictive of the four (4) classifications. Management of Class L areas is "oriented towards giving priority protection to sensitive natural, scenic, ecological, and cultural resources while placing limitations on other uses that may conflict with or degrade these values" (USDI 1980). The multiple use guidelines adopted for implementing the CDCA Plan in Class L lands recognize that locatable mineral operations are non-discretionary, but state that the development of locatable minerals on Class L lands would be limited to activities necessary to achieve extraction with minimum environmental impact, using best available mitigation technology and most effective feasible reclamation practices. The CDCA Plan further states that, in this class, BLM would review plans of

operation "for potential impacts on sensitive resources identified on lands in this class;" and that "Mitigation, subject to technical and economic feasibility, will be required."

Reclamation Requirements:

The Mining and Mineral Policy Act of 1970 (MMPA) mandates that federal agencies ensure that closure and reclamation of mine operations be completed in an environmentally responsible manner. The MMPA states that the federal government should promote the:

> "...development of methods for the disposal, control, and reclamation of mineral waste products, and the reclamation of mined lands, so as to lessen any adverse impact of mineral extraction and processing upon the physical environment that may result from mining or mineral activities."

The BLM's long-term reclamation goals are to shape, stabilize, revegetate, or otherwise treat disturbed areas in order to provide a self-sustaining, safe, and stable condition that provides a productive use of the land which conforms to the approved land-use plan for the area. The short-term reclamation goals are to stabilize disturbed areas and to protect both disturbed and adjacent undisturbed areas from unnecessary or undue degradation. Relevant BLM policy and standards for reclamation are set forth in the BLM Solid Minerals Reclamation Handbook (BLM Manual Handbook H-3042-1) which provides consistent reclamation guidelines for all solid non-coal mineral activities conducted under the authority of the BLM minerals regulations in Title 43 of the Code of Federal Regulations (BLM 1992a). The BLM must review the reclamation portions of the Imperial Mine POO to determine if the Proposed Action would meet BLM's reclamation standards and goals (see Appendix A).

Cyanide Management Plan Requirements:

The BLM's national cyanide management policy requires the BLM state offices to prepare a Cyanide Management Plan. The California State Office of the BLM prepared and administers the California Cyanide Management Plan (BLM 1992b). The plan is applicable to all public lands administered by the BLM in California, and it would be applicable to the proposed Imperial Project cyanide heap leaching and relevant precious metal recovery processes. The plan provides guidance on cyanide use in mining activities and lists the following objectives:

(1) Implement the BLM's national cyanide management policy;

(2) Ensure that mining operations using cyanide on BLM managed lands follow best management practices and do not cause unnecessary or undue degradation of the federal lands;

(3) Provide both the mine operator and the BLM technical staff with standards for development and evaluation of mining projects that use cyanide; and

(4) Use State Standards, if established.

The plan is not intended to duplicate requirements of other federal or state agencies with responsibility for managing the use of cyanide in mining operations. Where standards are established for mining operations by the responsible California Regional Water Quality Control Board (CRWQCB), such standards shall apply when reviewing a notice or a POO. BLM must review the Imperial Project POO to determine if it is in conformance with the California Cyanide Management Plan.

1.6.2. Imperial County

Imperial County, through the ICPBD, has assumed responsibility as the Lead Agency with respect to compliance with the California Environmental Quality Act (CEQA) (Public Resources Code 21000 *et seq.*). This document is being prepared as an EIR in compliance with CEQA, the Guidelines for the Implementation of CEQA (CEQA Guidelines) (14 CCR 15000 *et seq.*), and the applicable Imperial County guidelines for the preparation of an EIR.

The Project is required to comply with the California Surface Mining and Reclamation Act of 1975 (SMARA) and the applicable California Department of Conservation regulations in Title 14, California Code of Regulations, as implemented by the County of Imperial through the Planning/Building Department with respect to approval of a reclamation plan. The reclamation plan must be in accordance with SMARA, Imperial County's surface mining ordinance, and state minimum reclamation standards set forth in 14 CCR 3700-3713 relating to wildlife habitat; geotechnical requirements; erosion and sediment control; resoiling and revegetation; and other issues. Approval of the Project's proposed Reclamation Plan must be obtained from Imperial County prior to the commencement of construction, and the County may adopt conditions for the approval of the Reclamation Plan.

Imperial County ordinance requires the approval of a Conditional Use Permit prior to drilling of ground water production well(s). Imperial County's "Groundwater Management Ordinance" also requires that a permit be obtained from the Imperial County Public Works Director prior to commencing the drilling of ground water production wells intended for continued use. The Director must determine whether sufficient ground water is available for the proposed use based on the projected use of ground water by the project in accordance with Section 56614.01(b) of the Ordinance.

1.7. Purpose and Objectives of the Proposed Action

As referenced throughout this EIS/EIR, the Proposed Action consists of all of the activities which comprise the Imperial Project, as proposed by Glamis Imperial, and the overbuilding of the existing 34.5 kV electric transmission line.

In 1989, Glamis Gold, Inc. purchased the mining claims that comprise the Imperial Project from the previous claim holder. Between 1989 and 1995, Glamis Gold, Inc. had conducted a drilling program that identified valuable mineral deposits containing gold and silver on those claims within the areas outlined as the West Pit, Singer Pit, and East Pit within the Project mine and process area. The purpose of the Proposed Action is to develop and operate a mine to recover the gold and silver ore resources from these valuable mineral deposits identified on mining claims which have been staked or acquired by Glamis Imperial Corporation under the General Mining Law of 1872.

Glamis Imperial's objectives for the Proposed Action are to:

- profitably recover precious metals (gold and silver) from these staked mining claims;
- fully exercise its rights under the General Mining Law of 1872;
- reclaim the Project area in a manner that is environmentally responsible and in compliance with United States mining laws, the California Desert Conservation Area (CDCA) Plan, the Federal Land Policy and Management Act (FLPMA), the California Surface Mining and Reclamation Act (SMARA) and Imperial County's implementing regulations, and other applicable laws and regulations;
- continue to provide employment in Imperial County, California and Yuma County, Arizona for those individuals currently working for Chemgold, Inc. at its Picacho Mine in Imperial County, California when that mine ceases mining operations in late 1997; and
- directly increase the employment in the area by approximately 80 jobs.

1.8. Authorizing Actions

Based upon information received during the scoping process and during subsequent discussions with various agencies, certain authorizing actions have been identified as required, or probably required, prior to construction or operation of the Proposed Action. A list of these authorizing actions, organized by agency, is provided in Table 1.4.

Table 1.4: Agency Authorizing Actions Required for the Proposed Action

AGENCY		PERMIT NAME
Bureau of Land Management	El Centro Resource Area	Approve Plan of Operations for mine and process operations, including Reclamation Plan
		Approve Right-of-Way for existing and relocated sections of Indian Pass Road
		Approve authorizations for any wildlife guzzlers to be installed on public lands
		Approve Right-of-Way for new and overbuilt transmission lines and water wells and pipeline
United States Fish and Wildlife Service		Issue Opinion in Formal Consultation with BLM under Section 7 of the federal Endangered Species Act
United States Army Corps of Engineers		Approve Individual Clean Water Act Section 404 Permit
Bureau of Alcohol, Tobacco and Firearms		Approve Use of High Explosives Permit
California Regional Water Quality Control Board	Colorado River Basin Region	Approve Waste Discharge Requirements for discharges of waste to land
		Approve National Pollutant Discharge Elimination System Permit (NPDES) for Storm Water Discharge During Construction
		Approve National Pollutant Discharge Elimination System Permit (NPDES) for Storm Water Discharge from Industrial Facilities
		Approve Certification of Compliance with Section 401 of the federal Clean Water Act
California Department of Fish and Game		Approve California Endangered Species Act (California Fish and Game Code Section 2081) Management Permit
		Approve Stream or Lake Alteration Agreement (California Fish and Game Code Section 1601 or 1603)
California State Office of Historic Preservation		Section 106 Process
Imperial County	Planning and Building Department	Approve Reclamation Plan and Interim Management Plan for Project mine and process area facilities
		Approve Conditional Use Permit for drilling ground water production wells
		Certify Final Environmental Impact Report in conformance with the California Environmental Quality Act
		Approve Building Permits and Certificate of Occupancy
	Department of Health Services	Approve Individual Septic Disposal System Permit
		Approve Water System Permit
		Approve County Waste Transfer Station Permit
	Air Pollution Control District	Approve Authority to Construct to construct for applicable air pollution emission units
		Approve Permit to Operate to operate applicable air pollution emission units
	Department of Public Works	Approve Encroachment Permit for Project access off, and relocation of, Indian Pass Road
		Approve Ground Water Extraction Permit
	Board of Supervisors	Approve Revocation of Road for Project relocation of Indian Pass Road
	Fire Department	Approve Plan Review for conformance with Uniform Fire Code

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2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Proposed Action

This section has been modified from the November 1996 Draft EIR to reflect changes made in the Proposed Action, including the proposed Reclamation Plan, by Glamis Imperial, some of which were made in response to public comments on the November 1996 Draft EIR. The principal revisions to the Proposed Action since the November 1996 Draft EIR are listed in Table 1.3.

2.1.1. Introduction

The Proposed Action consists of two (2) general components: the Imperial Project, a proposed open-pit, heap-leach, precious metal mine; and the "overbuilding" of a sixteen (16)-mile section of an existing 34.5 kV utility electrical transmission line with 92 kV conductors to deliver the necessary electrical power to the Imperial Project.

The Imperial Project (Project) would include: mining gold and silver ore and waste rock at a typical daily mining rate of 130,000 tons per day (which would range from zero (0) to 200,000 tons per day); constructing and operating facilities to administer the operation and maintain all mining and related equipment; processing the ore utilizing conventional heap leach methods; stockpiling the waste rock; developing and producing ground water for use in processing operations and dust control; conducting geological survey activities within the Project mine and process area; implementing environmental impact reduction measures; and implementing reclamation measures, all of which have been designed to meet the anticipated permit requirements of the various federal, state and local agencies which regulate mining in the area.

As discussed throughout this document, the "Project area," in which all of the specific components of the Project would be located, consists of a "Project mine and process area" and a "Project ancillary area." Figure 2.1 shows the boundaries of the Project mine and process area and the Project ancillary area.

Specific Project components located within the Project mine and process area, and shown in Figure 2.2, include:

- Three (3) open pits, identified as the West Pit, East Pit and Singer Pit, and the Associated Areas of Disturbance adjacent to some of the pits;

- Two (2) waste rock stockpiles, identified as the East Waste Rock Stockpile and the South Waste Rock Stockpile;

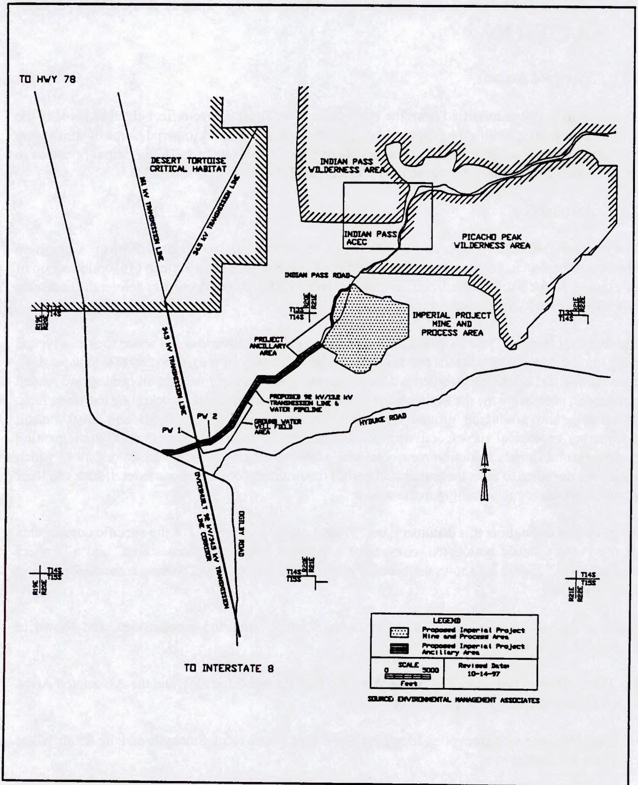

Figure 2.1: Imperial Project Facility Locations

- Two (2) soil stockpiles, identified as the West Soil Stockpile and the East Soil Stockpile;

- Five (5) stream drainage diversion channels, identified as the West Pit West Diversion, the West Pit East Diversion, the Singer Pit East Diversion, the East Pit West Diversion, and the East Pit East Diversion;

- One (1) administration office and equipment maintenance (shop) facility area;

- Ore processing facilities, including a lime bin, heap leach pad, and process solution (barren and pregnant) ponds;

- One (1) precious metal recovery plant;

- One (1) electrical power substation; and

- A system of roads (and associated electrical distribution lines);

Specific Project components located within the Project ancillary area include:

- One (1) ground water well field, consisting of up to four (4) production wells, designed to produce ground water at a combined peak yield of approximately 1,200 acre feet per year (afy)

- A buried water pipeline to convey the water from the ground water well field to the Project mine and process area;

- An approximately 3.7-mile section of new 92 kV/13.2 kV transmission line; and

- Relocated portions of Indian Pass Road, including the permanent realignment of the intersection of Indian Pass Road and Ogilby Road and the temporary relocation of an approximately 6,000-foot portion of Indian Pass Road, which would be moved approximately 1,000 feet to the west of its current location to provide continuous, safe public access to areas northeast of the Project mine and process area during the completion of Project activities.

Up to 150 million tons of ore would be mined and leached as part of the Project, and up to 300 million tons of waste rock would be mined and deposited in the waste rock stockpiles or the mined-out portions of the West Pit and Singer Pit. Mining activities, performed 24 hours per day and seven (7) days per week, would commence in 1998. Operations would terminate around the year 2017, although completion of all reclamation activities would continue beyond this date if necessary.

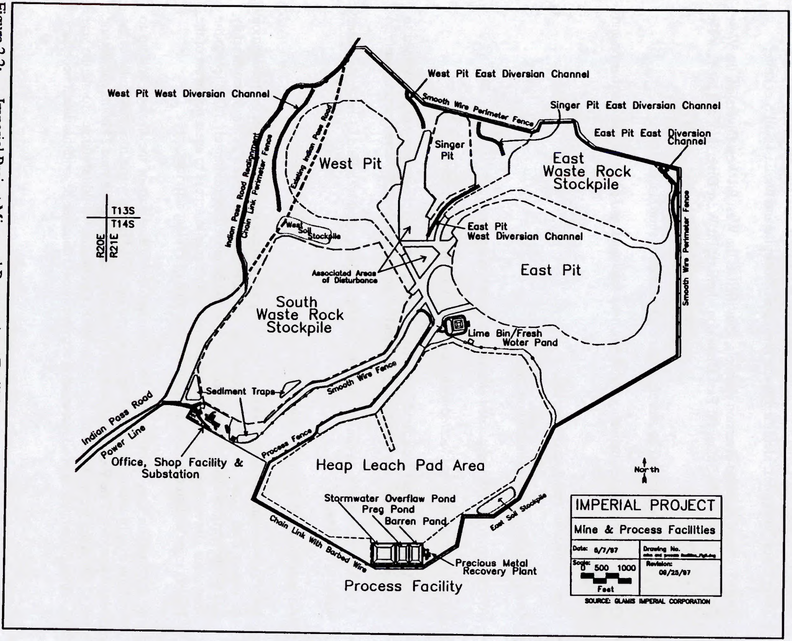

Figure 2.2: Imperial Project Mine and Process Area Facilities

In addition to the Project components described above, the Proposed Action includes the "overbuilding" of a sixteen (16)-mile section of existing 34.5 kV utility electrical transmission line with 92 kV conductors to deliver the necessary electrical power to the Imperial Project. All activities associated with the "overbuilding" of this transmission line would occur within the "overbuilt 92 kV/34.5 kV transmission line corridor," located outside of the Project area, as shown in Figure 1.2. "Overbuilding" the existing 34.5 kV utility transmission line would include: blading the existing access road, as necessary; establishing an equipment lay down area; delivery of new, taller pole(s) to the site of each existing pole; adding insulators and cross arms, as necessary, to each of the new poles; leaning the existing wooden poles out of the current transmission line alignment; setting the new, taller, wooden poles in the same transmission line alignment; stringing new 92 kV wire conductors near the top of the new poles and new 34.5 kV wire conductors below the 92 kV conductors on the new poles; energizing the new conductors; and removing the existing 34.5 kV conductors, poles and any other waste materials.

The Proposed Action would create a maximum of approximately 1,340 acres of new surface disturbance within the Project area, and approximately 22 acres of additional disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor during the "overbuilding" of the 92 kV/34.5 kV transmission line, for a total of approximately 1,362 acres of surface disturbance within the "area of the Proposed Action." An itemized list of the estimated surface disturbance for each of the major Project facilities and overbuilt 92 kV/34.5 kV transmission line, together with the undisturbed and reclaimed acreage within the Project mine and process area, is presented in Table 2.1.

2.1.2. Construction

Construction of Project facilities would commence once necessary approvals were obtained from the appropriate regulatory agencies. The initial construction phase of the Project would take up to six (6) months. Additional construction activities would also occur during the mine life, particularly during the completion of the later phases of the heap leach pad construction (see Section 2.1.8.1). Equipment necessary for construction activities would include a portable screen plant and crusher, scrapers, dozers, rollers, graders, portable generators, and other related equipment. As discussed in Section 2.1.9.1, employment of up to approximately 225 workers would be necessary to complete initial construction activities within the Project area. Construction activities which would occur during the routine mining operations would require up to 40 workers. Construction activities related to the overbuilding of the 92 kV/34.5 kV transmission line, which are discussed in Section 2.1.9.3.1, would require up to 30 workers.

Table 2.1: Estimated Disturbed, Reclaimed and Undisturbed Acres for the Proposed Action

COMPONENT			DISTURBED ACRES	RECLAIMED ACRES ON-SITE	RECLAIMED ACRES OFF-SITE[a]	UNDISTURBED ACRES
PROJECT AREA						
Project Mine and Process Area						
Mining Area	1	West Pit	110	110		
	2	East Pit	198	0	165	
	3	Singer Pit	33	33		
	4	Associated Areas of Disturbance	38	38		
Pad Facilities	5	Leach Pad	334	334		
	6	Process Area	24	24		
	7	Lime Bin Area and Fresh Water Pond	9	9		
Waste Rock Stockpiles	8	East Waste Rock Stockpile	135	135		
	9	South Waste Rock Stockpile	232	232		
Soil Stockpiles	10	West Soil Stockpile	20	20		
	11	East Soil Stockpile	10	10		
Support Facilities	12	Office/Maintenance/Parking/ Power Facilities	21	21		
	13	Haul and Ancillary Roads	94	94		
	14	Drainage Diversions	44	44		
Project Mine and Process Area Subtotal:			**1,302**	**1,104**	**165**	**269**
Project Mine and Process Area Total:			**1,302**	**1,269**		**269**
TOTAL PROJECT MINE AND PROCESS AREA ACREAGE:			**1,571**			
Ancillary Area						
Ancillary	15	County Road Realignment	7	7		
	16	Powerline/Water Pipeline	27	27		
	17	Water Wells and Access Roads	4	4		
Project Ancillary Area Subtotal:			**38**	**38**	**0**	**Not Applicable**
Project Ancillary Area Total:			**38**	**38**		**Not Applicable**
TOTAL PROJECT ANCILLARY AREA ACREAGE:			**38**			
PROJECT AREA ACREAGE SUBTOTAL:			**1,340**	**1,142**	**165**	**269**
PROJECT AREA ACREAGE TOTAL:			**1,340**	**1,307**		**269**
TOTAL PROJECT AREA ACREAGE:			**1,609**			

[a] As compensation for the 165 acres of East Pit slopes which would not be reclaimed, Glamis Imperial has offered to reclaim under an MOA developed with the BLM up to 165 acres of lands located off-site which were previously disturbed by others.

OVERBUILT 92 kV/34.5 kV TRANSMISSION LINE CORRIDOR				
Overbuilt 92 kV/34.5 kV Transmission Line	22	22	0	Not Applicable
TOTAL OVERBUILT TRANSMISSION LINE CORRIDOR ACREAGE:	**22**			

AREA OF THE PROPOSED ACTION SUMMARY				
Proposed Action Subtotal:	**1,362**	**1,164**	**165**	**269**
Proposed Action Total:	**1,362**	**1,329**		**269**
TOTAL PROPOSED ACTION ACREAGE:	**1,631**			

2.1.3. Mining

"Ore" is an economic term used to describe a resource which can be profitably mined and processed. The size and configuration of the proposed pits is defined by the precious metals content, depth of mineralization, metallurgy and other geologic, geotechnical and economic factors. Based on the results of exploration and development drilling, three (3) ore zones have been delineated. These would be mined as the West Pit, Singer Pit, and East Pit (see Figure 2.2). The estimated pit dimensions resulting from development of the currently known ore zones are listed in Table 2.2.

Table 2.2: Projected Surface Dimensions, Depth from Surface, and Pit Floor Elevations of the Open Pits

PIT	PROJECTED PIT DIMENSIONS			PIT FLOOR ELEVATION (ft Above Mean Sea Level)
	LENGTH (ft)	WIDTH (ft)	DEPTH (ft)	
West Pit	2,700	2,700	760	-60
East Pit	4,700	2,700	880	-60
Singer Pit	1,000	2,000	400	460

In the waste rock stockpile and leach pad areas, exploratory "condemnation" drilling was conducted on approximately 2,000-foot centers to identify possible open pit-type reserves. Drilling results from the waste rock stockpile and heap areas indicated that no continuity between assays or holes were identified which would indicate the presence of a minable resource at those areas.

Mining of the ore zones would employ conventional open pit mining techniques. The mining sequence would be phased, with the West Pit mined first, followed by the Singer Pit, and then mining of the East Pit. Figure 2.3 shows the projected final configuration of the West Pit following the completion of mining of that pit.

Mined waste rock would be placed on the waste rock stockpiles, located adjacent to the pits, or, as mining proceeds from one pit to the next, into the previously mined-out open pits. As mining progresses, the West Pit and Singer Pit would be backfilled. Figure 2.4 shows the projected final configuration of the East Pit and the backfilled and reclaimed West Pit and Singer Pit following final reclamation. Figure 2.5 shows the same final configuration and final contours in relation to the topography in the vicinity of the Project mine and process area.

The overburden thickness above the ore zones ranges from 40 to 350 feet and consists mostly of alluvial gravels (both unconsolidated and cemented) and minor amounts of volcanic rock. Mining of the unconsolidated gravels may not require blasting; however, the cemented gravels are expected to require blasting prior to excavation. Ore and some waste rock are comprised of weakly-altered gneiss. All of this material is expected to require drilling and blasting prior to excavation.

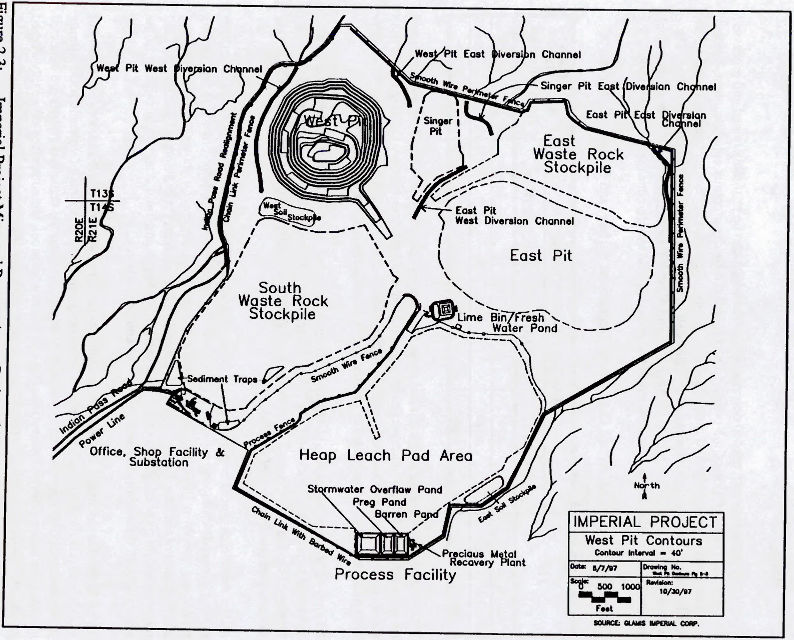

Figure 2.3: Imperial Project Mine and Process Area - Projected West Pit Contours

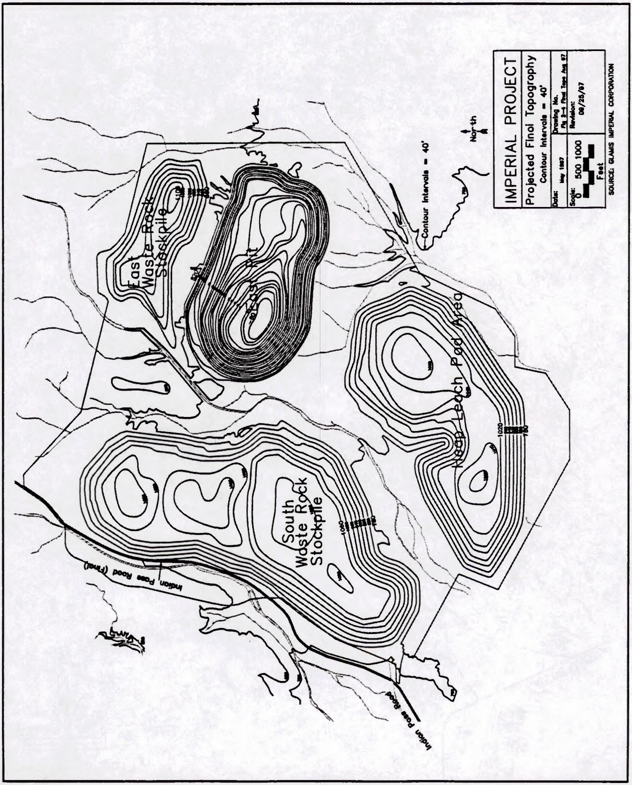

Figure 2.4: Imperial Project Mine and Process Area - Projected Final Contours

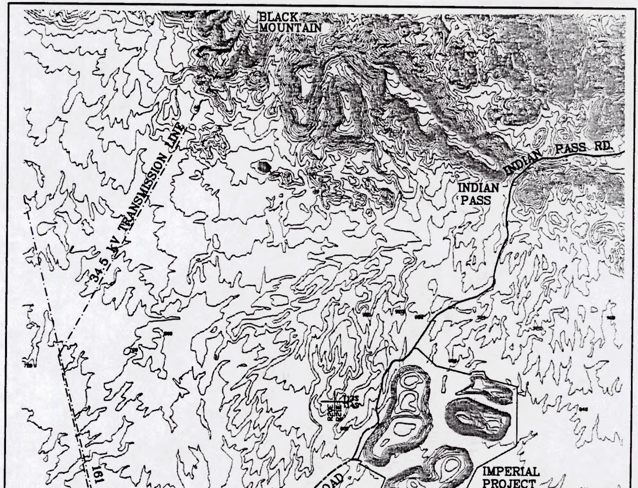

Figure 2.5: Imperial Project Mine and Process Area and Vicinity - Projected Final Contours

For blasting, mobile rotary blast hole drills would drill 6-3/4-inch to 12-inch diameter blast holes spaced on between 16- and 35-foot centers. The rock would be blasted with a conventional ammonium nitrate/fuel oil (ANFO) blasting agent, although an emulsion blasting agent may be used in the event water is found in the drill holes. Blasting would occur only during daylight hours. The blasted rock would be loaded, using an electric shovel or diesel front-end loader(s)/shovel(s), into 320-ton capacity haul trucks. No crushing of the ore is proposed, and run-of-mine (ROM) ore would be hauled by the haul trucks directly to the heap leach pad. Waste rock would also be hauled directly to a waste rock stockpile, or hauled to one of the pits to be backfilled (see Section 2.1.5). Haulage ramps in the pits have been designed with a minimum width of 120 feet and a maximum gradient of 10 percent. Minor sections of temporary ramping may be steeper and narrower. Haulage roads outside of the pit areas would be 120 feet wide, and in some areas would be 150 feet wide to allow for surface drainage areas and separate lanes for support vehicle traffic.

Haul roads adjacent to the pits may need to be relocated as the mining of the pits proceeds to ensure proper gradients and adequate separation for safety. Also, additional geological surveys, including drilling, are likely to occur in the areas located between the pits (see Section 2.1.10). To conservatively estimate the surface disturbance which may result from these activities, those areas located between the pits not otherwise disturbed by specific Project components have been designated as "associated areas of disturbance" (see Figure 2.2), and the associated acreage included in the estimated areas of disturbance in Table 2.1.

Engineering analyses indicate that the ultimate pit walls would have overall slope angles varying from 40 to 50 degrees (1 horizontal to 0.8 vertical [1H:0.8V] to 1H:1.2V), depending on location of the slope in each of the pits. Pit walls would have safety benches constructed at regular vertical intervals to contain minor rock spills. An additional stability study would be conducted for each of the deeper pits (West Pit and East Pit) after one (1) year of mining to ensure stability and confirm the accuracy of the original study. Following those studies, pit wall slopes may be changed slightly as actual mining conditions and geotechnical and safety factors warrant, although any changes would not disturb any lands not otherwise already proposed for disturbance under the Proposed Action.

Piezometer and exploration drill holes drilled in the projected locations of the bottoms of the East Pit and the West Pit have encountered ground water at depths of 88 feet above mean sea level (AMSL) and 211 feet AMSL, respectively, which is above the anticipated floor of the respective pits. As such, it is possible that ground water would enter either or both of these pits during mining operations. However, tests conducted to date have indicated that the hydraulic conductivity of the bedrock formation is very low, and total ground water inflow has been estimated at only 1.5 gpm for the West Pit and 0.7 gpm for the East Pit. Should ground water be encountered in the pits during mining operations, it would be utilized in dust control operations, or collected and used in process operations. No ground water is anticipated to be encountered in the Singer Pit.

Since the West Pit and the Singer Pit would be backfilled with waste rock mined from the East Pit, this would prevent the formation of a pit lake in either of these pits. Calculations conducted for the

East Pit indicate that the estimated annual evaporation rate is approximately 170 times the annual estimated ground water and precipitation inflow rates, indicating that the formation of a pit lake in the bottom of the East Pit after the cessation of mining activities is not probable. However, Glamis Imperial would conduct an assessment at the end of mining to determine if ground water encountered in the East Pit may enter the pit in sufficient quantities to create a pit lake in spite of evaporation. If this assessment indicates that the formation of a pit lake is likely, Glamis Imperial would then place sufficient backfill into the open East Pit to raise the floor of the pit to a level higher than the level of any pit lake which may be eventually predicted to form from the inflow of ground water.

2.1.4. Geochemical Characteristics of Mined Materials

Some types of waste rock, leached ore, or fresh ore can acidify contacting water when exposed to the atmosphere and ground or rain water. This ability is characterized as a rock's "acid potential." Generally, rock with a high acid potential contains disseminated sulfide minerals which can react with water and atmospheric oxygen to produce sulfuric acid. The generated acid may then leach potentially toxic metals and other constituents from the waste materials. Other waste rock, leached ore, or fresh ore may be acid-neutralizing under the same conditions. This is a rock's "neutralization potential." Waste rock materials with low acid potential and high neutralizing potential are generally environmentally benign.

Geochemical characterization analyses were conducted on waste rock and leached ore samples from the Project mine and process area to determine whether the ore and waste rock materials would have the potential to be acid generating, to determine the chemical characteristics of the potential leachate generated from these materials under various conditions, and to assess the potential interactions which may occur between the waste rock which may be backfilled into the pits and ground water (EMA 1995, see Appendix C-1; EMA 1996b; see Appendix C-2). The sampling and analyses procedures used to characterize the waste generated from the Project, as described in the following sections, were based on procedures generally accepted by the California Regional Water Quality Control Board, Colorado River Basin Region (CRWQCB) for characterizing mine waste material.

2.1.4.1. Static Test Analyses

As part of the Acid Neutralization Potential (ANP) analysis, the total sulfur content of each sample was determined to evaluate its acid potential (AP). The neutralization potential (NP) of each sample was also determined by titrometric methods. The ratio of NP:AP is the sample's acid neutralization potential (ANP). Based on these analyses, the potential for the Project waste rock and spent ore material to be acid generating was found to be low to very low. These findings are consistent with observations made by Glamis Imperial geologists that the ore and waste rocks are devoid of sulfide minerals.

2.1.4.2. Geochemical Characteristics

Metal analyses, using total metal and acidic rain water extraction methodologies (the latter using the U.S. Environmental Protection Agency (USEPA) Synthetic Precipitation Leaching Procedure (SPLP) (Method 1312)), were conducted on samples of waste rock and ore material. The SPLP is designed to simulate the concentrations of metals and other compounds which could be leached from waste materials exposed to acidic rainfall. Ore samples were first subjected to leaching by dilute cyanide solution to remove precious metals, then neutralized, to be representative of the leached ore material which would remain on the heaps following completion of Project activities.

None of the total extracted metal concentrations from the samples exceeded the State of California Total Threshold Concentration Limits (TTLCs) for characteristically toxic hazardous waste for any constituents tested, and most metal concentrations were an order of magnitude or more below the respective TTLC values. Metal concentrations detected in the solution extracted from samples using the SPLP method were all consistently very low (EMA 1995, see Appendix C-1; EMA 1996b; see Appendix C-2).

2.1.5. Waste Rock Stockpiles

Two (2) waste rock stockpiles are proposed: one (1) located south of the West Pit (the South Waste Rock Stockpile); and one (1) located north of the East Pit (the East Waste Rock Stockpile). The waste rock stockpile locations were selected to minimize disturbed acreage, stockpile height, and haulage distance. Up to 300 million tons of waste rock would be mined and placed onto the waste rock stockpiles or placed into the previously mined West Pit and Singer Pit. As described in Section 2.1.3, most of the waste rock consists of cemented and uncemented alluvial gravels, although some bedrock (Jurassic Age gneiss and minor amounts of Tertiary Age volcanic rock) would also comprise waste rock. No segregation of waste material is planned for the waste rock stockpiles.

The South Waste Rock Stockpile would be constructed first, followed by construction of the East Waste Rock Stockpile. These waste rock stockpiles would be constructed in successive 50-foot to 100-foot lifts, to a maximum height of 300 feet, and would be ultimately reclaimed to have overall 2 horizontal to 1 vertical (2H:1V), or 30 degree, final slopes. The waste rock stockpiles would be developed by end-dumping from the haul trucks, with the active face of each lift lying at the angle of repose of the waste rock (typically 1.5H:1V, or about 42 degrees).

As mining proceeds from the West Pit to the Singer Pit, and from the Singer Pit to the East Pit, waste rock would be placed into the previously mined-out West Pit and, ultimately, the Singer Pit.

2.1.6. Soil Stockpiles

Soil would be salvaged from the surface of disturbed wash areas within the Project mine and process area for use during reclamation (see Section 2.1.11.3.1) and would be stockpiled at one of two (2) proposed sites: the East Soil Stockpile, located to the east of the leach pad; and the West Soil Stockpile, located to the southwest of the West Pit (see Figure 2.2). The soil stockpiles would be clearly identified with signs to assure that the material was not misidentified as waste rock material. Both soil stockpiles would be located well away from surface water channels, and standard erosion control methods would be used to route any storm flows away from the stockpiles to natural drainages to minimize erosion (see Section 2.1.9.7).

2.1.7. Temporary Storage Areas and Construction Sites

The top surfaces of waste rock stockpiles and other areas approved for disturbance would be temporarily utilized for equipment storage, assembly and erection; and for the stockpiling of construction materials and aggregates produced on-site. The stockpiled construction materials and aggregates would be hauled from the temporary storage areas to mobile crushing and screening systems which would be brought to the Project mine and process area as necessary over the life of the Project to construct the sequential phases of the leach pad facility (see Section 2.1.8).

2.1.8. Ore Processing Facilities

Ore would be processed using conventional heap leach methods. This methodology is currently utilized by Chemgold, Inc., Glamis Imperial's sister company, at its Picacho Mine, located eight (8) miles east of the Project mine and process area; by other companies at the two (2) other mines located in the vicinity of the Project mine and process area; and at numerous other mines throughout the western United States. The process involves stacking the ore on an engineered, synthetically-lined, impervious pad. The surface of the ore heap is then wetted with an alkaline solution containing low concentrations of cyanide. This solution percolates through the ore, producing a soluble, precious metal-cyanide complex, known as the "pregnant" solution. The pregnant solution drains through the heap to the pad liner, then flows within a pipe drainage system to the pregnant solution storage pond. The gold/silver-bearing pregnant solution is then pumped from the pregnant pond to the processing facility, where the precious metals are extracted from the solution by way of a carbon adsorption process. The resultant "barren" solution, from which the gold/silver has been removed, then flows to the barren solution storage pond for the addition of makeup water, sodium hydroxide, and sodium cyanide, as necessary, before being pumped back to the heap to begin the cycle again.

The carbon from the adsorption process is stripped of its gold/silver by a stripping solution, from which the gold/silver is then electroplated onto steel wool or stainless steel cathodes. The gold/silver-bearing cathode material is shipped off-site for final refinement.

Development of the proposed ore processing facilities would include the construction of a 334-acre heap leach pad, a lime bin area, and a fresh water pond (the latter two (2) together comprising a total of approximately nine (9) additional acres). Associated processing buildings, process solution ponds, and a storm water retention pond would comprise approximately an additional 24 acres (see Figure 2.2 and Table 2.1). The heap leach pad, as well as the collection channels and process ponds, would be designed as lined, zero-discharge facilities with leak detection systems, in conformance with California Code of Regulations (CCR), Title 27, Division 2, Subdivision 1 regulations (formerly Title 23, Division 3, Chapter 15) and the CRWQCB Waste Discharge Requirements (WDRs) which would be prepared and adopted for the Project (see Section 2.1.8.1, Section 2.1.8.2 and Section 2.1.8.3).

2.1.8.1. Heap Leach Facility

The heap leach facility pad would be designed to hold up to 150 million tons of ore. The run-of-mine ore would be stacked at an approximate rate of 12 million tons per year. The leach pad liner and associated facilities would be constructed in three (3) to four (4) phases as space is required for new ore. A portable crusher and screen plant would be utilized to develop the aggregates for the liner system, which would come from the waste rock mined during normal mining activities. The construction materials would be temporarily stockpiled and then hauled to the liner system for installation. It is anticipated that liner system construction activities would occur once every two (2) to four (4) years.

As part of the leach pad construction, the site to be constructed would be graded to ensure solution drainage from the leach pad to the solution ponds. In addition, the heap benches and berms would be constructed to provide for 100 percent containment of the precipitation from the 1-hour probable maximum precipitation (PMP) design storm event (4.65 inches, which is the average of the 1-hour PMP from El Centro and Yuma) in order to minimize runoff from the heap piles and maximize infiltration of storm water into the heap piles. A service road and containment berm would be constructed around the perimeter of the pad to assure that process solution and rain which falls onto the heap drains to the pregnant solution pond. Interceptor ditches would be constructed to divert upstream surface runoff around the heap leach facilities. A six (6)-foot high, metal, chain-link fence, topped with one (1) foot of barbed wire ("process fence") would surround the entire leach pad and process area.

The heap leach pad liner would be designed to serve as an engineered alternative to the prescriptive standard for a Group B mining waste, waste pile, as contained in Title 27, Division 2, Subdivision 1, Article 7 of the CCR (formerly Title 23, Division 3, Chapter 15, Article 7), and may be approved, or modified, by the CRWQCB in the WDRs for the Project. The first portion of the leach pad, consisting of approximately 4.4 million square feet (designed to accommodate approximately 30 million tons of ore), would be constructed with a liner consisting of a composite of 40-mil polyvinyl chloride (PVC) primary and 20-mil PVC secondary geomembrane liners placed directly on a minimum of four (4) inches of compacted, fine-grained, bedding material (see Figure 2.6). Similar

liners were approved by the CRWQCB and constructed by others at the nearby American Girl mine in 1995. Third-party construction quality assurance/quality control (QA/QC) would be provided to ensure that lining and bedding materials and containment facilities were constructed in accordance with design specifications approved by the CRWQCB. If low permeability clay materials are developed in the West Pit, the subsequent phases of the leach pad liner may be constructed with a composite liner of 40-mil PVC geomembrane liner overlying twelve (12) inches of compacted, low-permeability clay materials with a maximum permeability of 1×10^{-6} cm/sec. If low permeability clay materials are not available, these later leach pad liners would be constructed similar to the liner for the first unit.

An engineered drain pipe network to collect the leach solution and convey it to the process ponds would be placed on top of the liner system for all four (4) phases of leach pad construction. Following the placement of one (1) layer of ten-ounce geofabric and one (1) layer of sixteen-ounce geofabric above the 40-mil PVC geomembrane liner, a 12-inch layer of minus 3-inch screened/crushed, free-draining gravel would be placed on top of the liner system to protect the liner, facilitate the collection and removal of leach solution, and minimize the hydraulic head on the synthetic liner (see Figure 2.6). The screened gravel would be placed at a thickness of 24 inches in localized areas to anchor and protect the engineered drain pipe network.

A containment berm, with a minimum height of six (6) feet, would be constructed around the perimeter of the ore heap. The ore heap would be typically set back eighteen (18) feet from the inside crest of the berm. The leach pad system would be designed such that pregnant solution would drain internally to the central pipe network and into the pregnant solution pond. No exposed solution ditches would be present. A containment berm for the 24-inch solution pipes would be installed along the downhill toe of the leach pad. Containment berms and other higher-sloped areas would be constructed with a minimum of 6 inches of compacted, fine grained bedding material.

The first lift of run-of-mine ore would be loaded onto the heap leach pad directly over the protective layer of free-draining gravel. The ore would be loaded onto the pad, without prior crushing, by end-dumping from the haul trucks. Approximately two (2) pounds of lime per ton of ore would be placed onto the trucks at the lime bin location prior to dumping. The ore would be spread and scarified by a bulldozer to produce a heap pile with relatively uniform thickness and percolation characteristics.

The proposed heap leach facilities would be constructed in progressive lifts to a maximum height of 300 feet above existing grade. Overall exterior slopes would not exceed 2H:1V (30 degrees), and would be designed for operational stability, decommissioning, and final reclamation (see Section 2.1.11.2.5). Barren solution would be applied to the ore using conventional drip emitter irrigation technology. Sprinklers would be used to apply water during decommissioning and rinsing of the heaps, and possibly to apply barren cyanide solution after major storm events to facilitate evaporation of excess water.

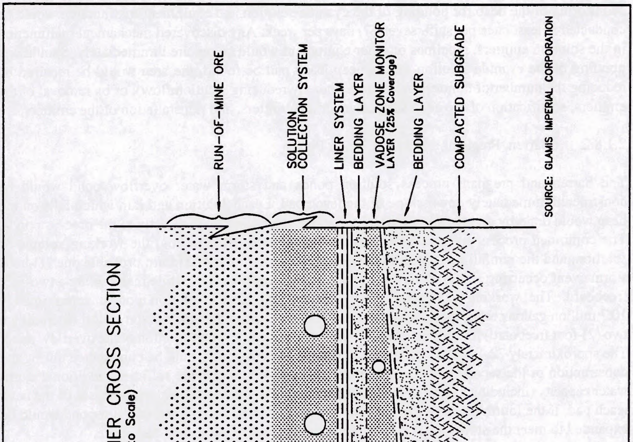

Figure 2.6: Typical Cross Section of Heap Leach Containment System

Monitoring of the heap for ponding of the cyanide solution and equipment malfunction would be conducted at least once per shift, seven (7) days per week. Any discovered mechanical malfunction in the solution emitters, pipelines or other equipment would be repaired immediately. Should any ponding of the cyanide solution on the heap leach pad be found, the area would be repaired by reducing the number of emitters in the area (thereby reducing solution flow), or by removal of the emitters, scarification of the heap surface under the emitters, and reinstallation of the emitters.

2.1.8.2. Barren, Pregnant and Storm Water Ponds

The barren and pregnant process solution ponds and storm water overflow pond would be constructed immediately down-slope of the leach pad. Leach solution and rain which falls on the heap would drain by gravity through the heap to the liner, then drain directly to the process ponds. The combined process and overflow ponds have been designed to hold the working volume of solution, and the rainfall run-off from the heap resulting from a maximum probable one (1)-hour storm event occurring simultaneously with a 24-hour power outage, while maintaining a two-foot freeboard. The working capacity of the pregnant and barren solution ponds, approximately 10.7 million gallons each, would together be sufficient to store the storm water runoff (including a two (2)-foot freeboard) for the first phase of the leach pad without construction of the overflow pond. The approximately 22.4 million gallon storm water overflow pond would be constructed during the construction of the second phase of the leach pad, and would provide sufficient additional storm water capacity (including a two (2)-foot freeboard) for both the second and third phases of the heap leach pad. If the fourth phase of the heap leach pad is constructed, the storm water pond would be expanded to meet the storm water runoff requirements for the additional pad space.

All pond liner systems are currently proposed to consist of an inner 40-mil thick PVC liner and an outer 45-mil thick polypropylene liner, separated by geonet on the pond sides and a geotextile layer on the pond bottom. The geonet/geotextile is part of the leachate collection and recovery system (LCRS), which also includes a sump, consisting of select drain fill placed at the lowest corner of each pond between the geomembrane liners. A leak detection well, consisting of 8-inch diameter, Schedule 80 PVC pipe, would be placed in the sump and "daylighted" at the top of the pond for monitoring any fluid which reached the sump. The well pipe would be screened in the sump material.

The pregnant and barren solution ponds would be constructed with solution pond covers consisting of small-mesh nets. Similar netting systems have been used successfully to date by Chemgold, Inc., Glamis Imperial's sister company, at its Picacho Mine, and at many other mines operating throughout the Western United States. Discharge of leach solution and precipitation from the leach pad to the ponds would occur in pipelines within the netted area of the ponds.

2.1.8.3. Vadose Zone and Ground Water Monitoring

A vadose (unsaturated ground water) zone monitoring system would be installed to detect potential leaks in the pad lining system. This vadose zone monitoring system is currently designed to consist of perforated liquid collection pipes in a gravel bed installed beneath the liner system and above a 20-mil PVC sheet (see Figure 2.6). This vadose zone monitoring system would underlay approximately 25 percent of the leach pad liner, and be located directly under the main process solution collection pipes, the lowest points of the heap leach pad liner.

Two (2) monitoring wells, one (1) located at the upgradient boundary and one (1) located at the downgradient boundary of the Project mine and process area near the heap, have already been installed by Glamis Imperial, and quarterly samples of the ground water are being taken. A ground water monitoring program for these would be implemented by Glamis Imperial to sample and test the ground water passing beneath the leach pad and ponds to detect leakage, if any, from these facilities into this ground water.

2.1.9. Support Facilities

Support facilities located within the Project mine and process area would include: office buildings with approximately 7,000 square feet of floor space; an approximately 80-foot tall maintenance shop of approximately 20,000 square feet on a reinforced concrete slab; telephone facilities, including a microwave communications antenna; explosives magazines; an ammonium nitrate storage facility; a lime storage facility; chemical storage areas; diesel fuel storage areas; water storage facilities; an electrical substation and electrical distribution powerlines; an emergency electrical power generator; a temporary hazardous waste storage area; equipment wash facilities; a laboratory; roads; and surface flow and erosion control structures. Project support facilities located within the Project ancillary area would include: water supply wells and connecting pipeline; electrical power lines; and the realignments of portions of Indian Pass Road. Project support facilities located outside of the Project area would consist only of the overbuilt 92 kV/34.5 kV electrical transmission line.

2.1.9.1. Manpower

Approximately 225 workers may be required to construct the Project facilities; however, only a percentage of these workers would be employed at the Project mine and process area at any given time. Contractor personnel would be hired to: construct the leach pad liner systems, ponds, process plant and related facilities; perform civil construction, concrete work, liner installation and quality assurance/quality control; install electrical utilities and communication systems; and complete other miscellaneous tasks. Glamis Imperial employees would be utilized for: construction management; technical services; pre-stripping the orebodies; earth moving; and facility preparation.

When in full production, the mine would employ approximately 120 full-time employees. Mining and processing operations would be conducted up to 24 hours per day, up to 365 days a year. The

work force would likely be predominantly from Imperial County, California and Yuma County, Arizona. It is anticipated that the 40 current Picacho Mine employees would transfer to the Project after the completion of mining at the Picacho Mine. Employment levels for the Project would remain relatively constant for the life of the mining operations, then be reduce during implementation of final reclamation. Employees would be encouraged by Glamis Imperial to carpool to the Project area.

2.1.9.2. Water Supply and Distribution System

Development of a water supply system would be required to supply water to the Project sufficient to operate the heap leach and related facilities, and provide water for dust control. Peak water consumption for the Project is expected to average approximately 1,200 acre feet per year.

Water used in the heap leach process would be recycled back onto the leach pad (see Section 2.1.8). Evaporation losses from the heap leach process would be minimized through the use of drip irrigation emitters, and the absence of open flow ditch channels. Approximately 75 percent of the total Project water consumption would be for the heap leach process, including capillary retention of water within the heap. Dust suppression, reclamation activities, domestic use, and construction would account for the remaining 25 percent of Project water consumption.

Glamis Imperial is proposing to develop a ground water well field to provide the Project water requirements. Production of the water would require drilling and completion of up to four (4) water wells within the Project ancillary area. A test well has been completed, and this well (PW 1)would be upgraded to a production well for the Project if approved by the County of Imperial. A location for the second well (PW 2) has been defined, and it is expected that these two (2) wells should be sufficient to provide the necessary water for the Project. Should additional well(s) be required, they would be located in the Project ancillary area adjacent to Indian Pass Road next to the water pipeline right-of-way within 1.5 miles of the initial test well (see Figure 2.1). The water would be pumped to the surface from a depth of 800 to 1,000 feet below ground surface (bgs) by electrical pumps. The water would be conveyed by buried 12-inch pipeline from the wells to above-ground water storage and distribution tanks, or to the fresh water storage pond, constructed within the Project mine and process area. Both the buried pipeline, and any required electric power distribution line needed to power each of the well pumps, would be constructed within the right-of-way, adjacent to the access road to each well. An area of less than approximately one (1) acre would be disturbed by each well and its associated access road. An area of substantially less than one (1) acre around each well would be fenced to control access to the well-head equipment.

2.1.9.3. Electric Power Supply and Utilities

2.1.9.3.1. Electrical Power

Peak electrical power requirements for the Project would be approximately 8 MW, which would be supplied from the utility power system. To deliver this power to the Project, an existing 34.5 kV transmission line owned by the local electrical utility, the Imperial Irrigation District (IID), would be "overbuilt" with a new 92 kV transmission line, to also be owned by the IID (see Figure 2.7). Approximately sixteen (16) miles of this 34.5 kV transmission line would be overbuilt, from immediately south of Interstate Highway 8 and immediately east of Sidewinder Road to Indian Pass Road near Ogilby Road. This new 92 kV/34.5 kV transmission line would be connected to the existing IID 92 kV "C-Line," located immediately south of Interstate Highway 8. At the point where the existing 34.5 kV transmission line crosses Indian Pass Road, a new 92 kV transmission line would be built adjacent to the south side of Indian Pass Road to a 92 kV/13.2 kV mine substation located within the Project mine and process area (see Figure 2.7). The new substation would be constructed to transform the electrical power to the 13.2 kV voltage used by the Project. A 13.2 kV distribution line would be "underbuilt" on the same poles as the new 92 kV transmission line running adjacent to Indian Pass Road to provide power as necessary to the ground water well pumps located adjacent to Indian Pass Road in the Project ancillary area. Special devices would be installed on this new transmission line at each point where the direction that the transmission line changes which would be visible at night only to military pilots using night vision devices to prevent collisions with ground-following aircraft (see Section 3.9.2).

The mine substation would be enclosed within a fenced area approximately 100 feet by 100 feet in size located inside the Project mine and process area at the entrance near the parking facility. Emergency power requirements for essential loads and services for the Project during periods of utility service interruption would be provided by a ±750 kW, diesel-powered, electric generator located near the processing facility in the Project mine and process area. "Overbuilding" the existing 34.5 kV transmission line with the 92 kV transmission line would entail the following: (1) regrading the existing access road as necessary to accommodate truck-trailer traffic; (2) establishing an equipment lay down area for the temporary storage of equipment and materials; (3) delivery of new pole(s) to the site of each existing pole; (4) "framing" each of the new poles (adding insulators and cross arms, as necessary); (5) leaning the existing wooden poles to the west to move the electrical conductors out of the current transmission line alignment; (6) setting new, taller, wooden poles in the same transmission line alignment; (7) stringing the new 92 kV wire conductors near the top of the new poles and new 34.5 kV wire conductors below the 92 kV conductors on the new poles; (8) energizing the new conductors; (9) removing the existing conductors; and (10) removing the existing poles and any other waste materials. Construction of the new 92 kV/13.2 kV transmission line would require the same steps as construction of the "overbuilt" 92 kV/34.5 kV transmission line except for steps (5), (9), and (10), since there is no existing transmission line to lean or remove.

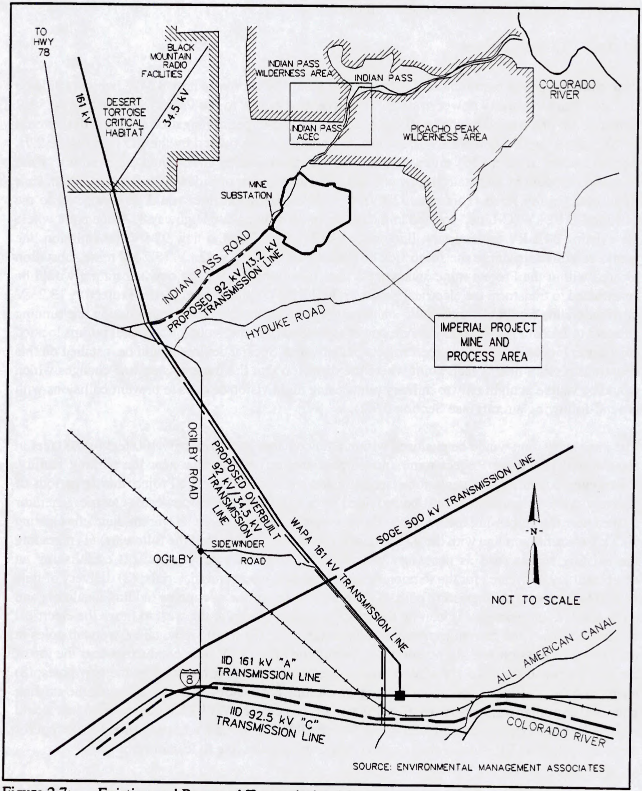

Figure 2.7: Existing and Proposed Transmission Lines

The 92 kV/34.5 kV transmission line would be constructed by the IID under an amendment to the current 20-foot wide right-of-way granted by the BLM and the easements obtained from the private landowners near Interstate Highway 8 for the existing 34.5 kV transmission line to allow the installation of the taller poles and two (2) conductor sets. Approximately 22 acres would be disturbed during the construction of the overbuilt 92 kV/34.5 kV transmission line.

Construction of the new approximately 3.7 mile-long 92 kV/13.2 kV transmission line along Indian Pass Road to the Project mine and process area has been conservatively estimated as disturbing a total of 27 acres (3.7 miles times the entire width of the requested 60 foot right-of-way). This would include the disturbance from the construction of the buried water pipeline within the same right-of-way. Actual disturbance required to build the new transmission line and pipeline is expected to be much less.

Principal access for construction of the new 92 kV/13.2 kV transmission line would be Indian Pass Road itself. However, short access spur roads from Indian Pass Road to the transmission line/pipeline corridor would be constructed at three locations along the 3.7 mile length in those areas where the corridor is separate from Indian Pass Road by as much as 250 feet. The IID would own and operate the new 92 kV transmission line, and would also construct, own and operate the approximately 100-foot by 100-foot substation within the Project mine and process area. The surface disturbance that would be created by this new construction for the transmission line, pipeline, and electric substation are included as part of the Proposed Action within the Project area.

2.1.9.3.2. Telephone Service

Telephone service would be provided to the offices and maintenance shop by an FCC-approved microwave telephone system. A transmitter-receiver (low height) would be constructed within the Project mine and process area, which would beam the signal to existing facilities located on Black Mountain, which then connects to the land-based telephone system; no new facilities would be constructed outside of the Project mine and process area. Field communications would be provided by an FCC-approved FM mine communication system.

2.1.9.3.3. Exterior Lighting

Exterior lighting would be the minimum necessary, consistent with safety requirements and 24-hour-per-day operations. Low-intensity "street" lighting would be installed in the administration area; in the process area on the precious metal recovery plant, and on the lime bin. Portable 35 hp diesel-powered light plants would be used in the Project mine and process area to illuminate the active working areas during nighttime hours; two (2) plants in the active pit, one (1) on the active waste rock stockpile, and one (1) on the heap leach pad. All of the haul trucks, light-weight trucks, and operating earth-moving equipment would be equipped with headlights.

2.1.9.4. Chemical Use and Storage

Numerous chemicals would typically be transported to, stored at, and used by, the Project (see Appendix A for a complete list of chemicals stored and used). These can be generally categorized as heap leach processing chemicals; mine chemicals/explosives; maintenance facility/power generation chemicals; and laboratory chemicals. Approximately three (3) truck loads of chemicals would be delivered per day. All chemicals would be transported and stored in conformance with local, state and federal regulations and company safety policies.

Miscellaneous laboratory chemicals would be maintained in small quantities only and kept in containers in the on-site laboratory. Most of the bulk chemicals would be stored in closed, weather-proof containers in secured, open-air storage areas.

Heap Leach Processing Chemicals:

The principal heap leach processing chemical, sodium cyanide, would be shipped and received in the manufacturer's dry bulk trucks. Solid sodium cyanide, in the form of briquettes, would be put into solution directly from the dry bulk trucks at the Project mine and process area process facility by circulating an alkaline solution through the truck until the briquettes have dissolved. The resulting solution, about 30 percent cyanide and at a pH of about 13, would be stored in one (1) of two (2) 20,000 gallon storage tanks. All cyanide would be stored within the lined portion of the Project process area, immediately adjacent to the process ponds, and surrounded by a security fence. Sodium cyanide solution would be metered directly into the barren solution in the pipes leaving the barren solution pond for application to the heap. The cyanide concentration of the barren solution applied to the heap would be maintained at the desired 200 to 350 parts per million (ppm) for effective leaching of the ore. Similar cyanide handling practices are currently utilized at the Picacho Mine, and are standard in the precious metal processing industry. Annual sodium cyanide usage for the Imperial Project is anticipated to be approximately 1,750 tons.

Other heap leach processing chemicals, including sodium hydroxide (for cyanide solution pH control) and hydrochloric acid (for carbon cleansing), would be stored in a secured, lined containment area, near the process facility. Acids would never be stored near cyanide. Calcium oxide (lime), which would be added directly to each haul truck prior to loading the ore on the heap leach pad, would be stored in silos on the north end of the heap leach loading ramp. Anti-scalants (principally polymaleic acid) would be stored adjacent to the process ponds. Calcium hypochlorite $[Ca(ClO)_2 \cdot 4H_2O]$ would be kept on the Project mine and process area to neutralize any small spills of liquid NaCN. Annual usage of these chemicals is estimated at 150 tons for sodium hydroxide; 212 tons for hydrochloric acid; 16,500 tons for lime; and 150 tons for polymaleic acid.

Mine Chemicals/Explosives:

The mine chemicals/blasting agents and associated explosives which are necessary for mining operations would be stored in magazines in compliance with U.S. Bureau of Alcohol, Tobacco and Firearms (ATF), and Mine Safety and Health Administration (MSHA), safety standards. The ammonium nitrate used in blasting would be stored in bulk in silos adjacent to the lime bin facility. Annual consumption of the bulk ammonium nitrate would be approximately 7,500 tons.

Maintenance Facility/Power Generation Chemicals:

The maintenance facility/power generation chemicals stored and used in the greatest quantities would be diesel fuel, unleaded gasoline, and motor oil, all of which would be stored in above-ground tanks located within a containment structure located next to the maintenance shop. Annual consumption of gasoline is estimated at approximately 40,000 gallons, and annual lubricant consumption is estimated at 31,000 gallons. Annual diesel fuel consumption for blasting and fueling on-site equipment and use in the emergency generator is estimated at 4 million gallons.

2.1.9.5. Waste Disposal

Septic treatment systems with leach drain fields would be installed near the office and shop facility, adjacent to the processing and laboratory facilities, and adjacent to the lime storage facility. Glamis Imperial would contract with local disposal service companies for the pumping of septic tanks and the removal of other non-mining waste (trash) from the Project area for disposal in an approved landfill. These wastes are estimated at one (1) ton per day, based upon historic Picacho Mine and Mesquite Mine data. Regulated wastes, such as used antifreeze, spent solvents, batteries, and used oils and oil filters, would be transported off-site by a company authorized to recycle these regulated wastes. These wastes would be recycled or disposed of in conformance with all applicable local, state and federal laws and regulations, and in a manner approved by the responsible regulatory agencies. These wastes are also estimated to be approximately one (1) ton per day, based on historic Picacho Mine data.

Major maintenance of equipment would be conducted within the concrete-paved and bermed areas of the maintenance yard to the extent possible to minimize accidental discharges of waste lubricants and other materials to the ground. All mining equipment would be equipped with the "EVA" servicing system, which allows quick, "leak-free" lubricant servicing from mobile and stationary servicing equipment.

2.1.9.6. Roads

Haul roads constructed to haul mined material within the Project mine and process area would typically be approximately 120 feet wide, although in some areas would be as much as 150 feet wide to allow for surface drainage areas and separate lanes for support vehicle traffic. Service or

maintenance roads within the Project mine and process area would be approximately 30 feet wide. A service road would be constructed inside the perimeter fence around the perimeter of the Project mine and process area to provide access for maintenance and security; in some locations, this perimeter road would be coincident with constructed haul roads. All road crossings of ephemeral stream channels would be at existing grade.

Access to the Project would be from Ogilby Road, a county-maintained two-lane paved road, via Indian Pass Road, a county-maintained gravel road (see Figure 2.8). Project traffic on Ogilby Road and Indian Pass Road is estimated at approximately 47 light-weight vehicle round trips per day during normal operations, which assumes, based upon the experience of other mines in the area, that approximately 25 percent of workers carpool to work. Heavy truck traffic is estimated at approximately 3.5 round trips per day.

Small numbers of light vehicles (less than one (1) per day) may also occasionally access the Project area from Chemgold, Inc.'s Picacho Mine, located eight (8) miles to the east of the Project area, via BLM Route A278, Hyduke Road. Neither Hyduke Road nor the BLM open routes of travel in the vicinity of the Project mine and process area would be used for heavy truck or equipment traffic. Occasional use of Hyduke Road by light-weight vehicles would continue until final closure and reclamation of the Picacho Mine in approximately the year 2003.

The approximately 6,000-foot section of Indian Pass Road located within the Project mine and process area would be relocated prior to mining the West Pit, as the pit would occupy the road's current location (see Figure 2.2). Figure 2.2 shows the proposed relocation of Indian Pass Road, which would shift the road approximately 1,000 feet to the west of its current location to allow safe, continued public access to areas north of the Project mine and process area. Construction of the realigned section of Indian Pass Road would begin immediately following receipt of approvals to proceed with the Project and would require approximately one (1) month to complete. The entire length of Indian Pass Road would be maintained open to the public during this construction.

The intersection of Indian Pass Road and Ogilby Road would also be re-engineered and realigned to have Indian Pass Road meet Ogilby Road at a right angle, rather than the acute angle which the intersection now has. This would be accomplished by constructing a new intersection approximately 330 feet south of the current intersection of Ogilby Road and Indian Pass Road, and connecting the current alignment of Indian Pass Road with this new intersection through a 60° turn with a radius of approximately 105 feet. The abandoned section of Indian Pass Road would be regraded and reclaimed.

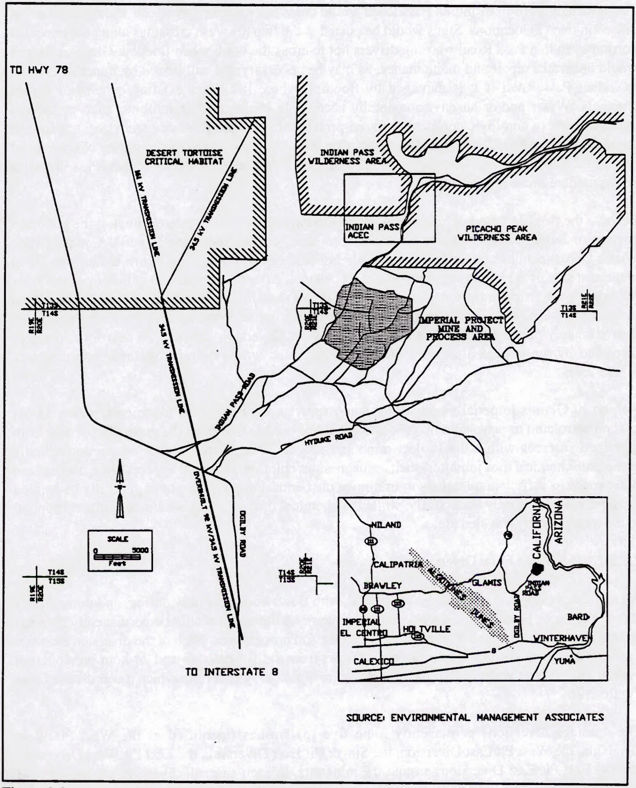

Figure 2.8: Access Roads and Open Routes of Travel

The relocated portion of Indian Pass Road would cross the western ephemeral stream channel "at grade" in two (2) locations. Signs would be posted at the two (2) wash crossings along the relocated portion of Indian Pass Road warning drivers not to cross the wash when flooded. Glamis Imperial would undertake repair and maintenance, as may be necessary and authorized by Imperial County, to Indian Pass Road if it is damaged by flooding where it crosses existing ephemeral stream channels. Water and/or an environmentally acceptable chemical dust inhibitor such as sodium lignosulfonate (a non-toxic non-hazardous, co-product of cellulose produced from trees), would be applied to Indian Pass Road from its intersection with Ogilby Road to the boundary of the Project mine and process area. Glamis Imperial plans no other alterations to Indian Pass Road to accommodate mine-related traffic.

Because the two (2) "at grade" crossings of the western ephemeral stream channel of the relocated portion of Indian Pass Road present a long-term maintenance issue, the Imperial County Public Works Department has requested, and Glamis Imperial has committed, to return Indian Pass Road to the east side of the western ephemeral stream channel. After the completion of mining of the West Pit, waste rock stripped from the sequential mining of the Singer Pit and East Pit would be placed in the mined-out West Pit. Indian Pass Road would then be returned to a location east of and approximately parallel to the diverted West Pit West Diversion channel. At that time, the area disturbed by the relocated segment of Indian Pass Road would be regraded and reclaimed (see Figure 2.4).

As part of Glamis Imperial's operations, water sprays and/or chemical treatments, which do not contain petroleum or petroleum by-products, would be used to minimize the generation of dust from disturbed surfaces within the Project mine and process area. Water, and/or an environmentally acceptable chemical dust inhibitor, such as magnesium chloride, would be applied to the haulage and other roads in sufficient quantities to minimize dust emissions. Water would generally be applied on those roads used only temporarily, while the chemical dust inhibitor would be routinely applied to the more heavily traveled areas.

2.1.9.7. Surface Flow Diversions

All surface drainages in the area are ephemeral, with flows occurring only during, and immediately following, major precipitation events. Several ephemeral drainages would be permanently diverted around the facilities located within the Project mine and process area. Each of the diversion channels has been designed to safely convey all runoff flows from the 100-year, 6- and 24-hour precipitation events, and to direct water back into the same major drainage system from which it was diverted (see Figure 2.9).

The drainage diversions permanently route five (5) washes (identified as the West Pit West Diversion, the West Pit East Diversion, the Singer Pit East Diversion, the East Pit West Diversion, and the East Pit East Diversion) around the mine pits. In each case, all diversion channels would channel surface flows either back into the same drainage channel, or into another existing nearby

drainage channel which flows back into the same drainage channel within the Project mine and process area. These diversion channels would be built to approximate the original drainage system in both gradient and channel geometry (see Figure 2.10). During the period that an adjacent pit is open, a diversion channel may be temporarily lined with high density plastic or clay protected by rip rap to prevent subsurface flows into the open pit. Additionally, any areas of the diversion channels which might be especially susceptible to erosion from surface flows would be bermed and/or rip-rapped to prevent erosion and potential damage during the period when an adjacent pit is open. Once the pits have been backfilled (see Section 2.1.3), or mining is complete, any rip rap or temporary plastic liners installed in a diversion channel would be removed and the channel regraded. Once all construction activity within a diversion channel has been completed, stockpiled soil from disturbed washes would be spread along diversion channel banks. The channel slopes and banks would be planted with wash vegetation directly transplanted from other disturbed drainages and/or selectively planted with young ironwood and palo verde trees or seedlings to begin to reestablish microphyll woodland habitat similar to that removed by excavation of the original stream channel.

2.1.9.8. Fences

Prior to the initiation of operations, fencing would be installed around Project facilities to protect the public and wildlife. A 3-strand, 4-foot high, smooth-wire fence would be erected along the entire Project mine and process area boundary, and the southern portion of the central drainage, except as noted below. Along the entire western boundary of the Project mine and process area, generally along the boundary adjacent to Indian Pass Road, a 6-foot high chain-link fence would be constructed (see Figure 2.2). In addition, those portions of the Project mine and process area boundary coincident with the ore leach pad or process facilities would be fenced with six (6)-foot high, metal, chain-link fencing topped with one (1) foot of barbed wire (see Figure 2.2). In areas where the fence crosses an ephemeral stream channel, the fence would be designed to minimize damage during storm events. These sections of fence would be inspected immediately following a flow event and appropriate repairs undertaken in the event that the fence is damaged to prevent public or wildlife access to the Project mine and process area.

Tortoise-exclusion fencing would be installed coincident with the entire perimeter fence. The tortoise-proof fence construction, and material specification, would be approved by the BLM prior to installation. Typical fence construction would consist of 1.5 feet of 0.5-inch mesh hardware cloth above the ground surface. An additional one (1) foot of the mesh would either be buried below ground level, or bent at a right angle towards the outside of the fence and covered with gravel and rocks to prevent animals from burrowing under the fence. The uppermost portion of the hardware cloth would extend not more than two (2) inches above the lowermost wire strand. T-posts, or other suitable anchoring posts, would be placed at appropriate intervals (usually 10- to 16-foot spacing). The entire ore leach pad and process facilities, and the fresh water pond, would be fenced with 6-foot high, metal, chain-link fencing topped with one (1) foot of barbed wire (see Figure 2.2).

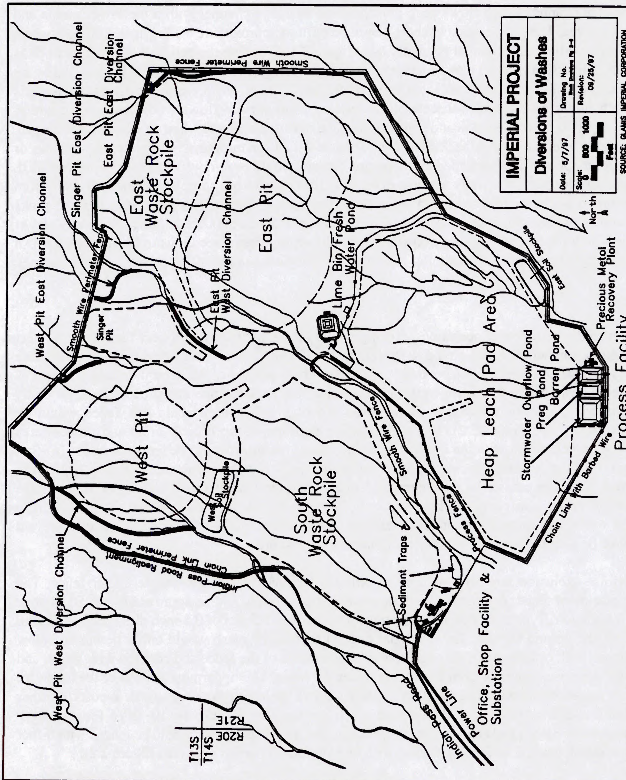

Figure 2.9: Diversions of Washes Within the Project Mine and Process Area

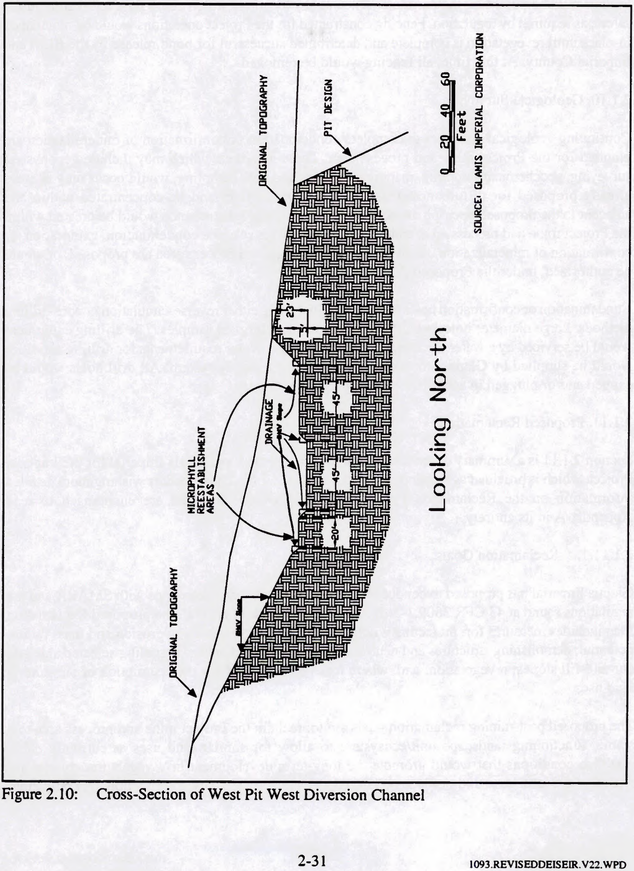

Figure 2.10: Cross-Section of West Pit West Diversion Channel

Signs would be posted on the perimeter fence at any locations which could pose a threat to public safety, as required by regulation. Fencing constructed for the Project operations would be maintained in-place until revegetation is complete and determined successful for bond release by the BLM and Imperial County. At that time, all fencing would be removed.

2.1.10. Geological Surveys

Continuing geological activities to complete condemnation or confirmation of mineralization are planned for the Project mine and process area. These activities, which may include geophysical surveying, geochemical sampling, mapping, drilling, and bulk sampling, would occur only in areas already proposed for disturbance under the Proposed Action, and be concentrated within and adjacent to the proposed open-pit areas. No additional surface disturbance would be created within the Project mine and process area, and no geological surveys for the condemnation, exploration, or confirmation of mineralization outside of the Project mine and process area are proposed, or would be authorized, under the Proposed Action.

Condemnation or confirmation holes would be drilled using either reverse-circulation or core-drilling methods. Large diameter holes would be drilled for metallurgical samples. The drilling equipment would be serviced by a water truck/pipe truck/crane truck. Water requirements for drilling activities would be supplied by Glamis Imperial's proposed water supply system. All drill holes would be capped and/or plugged in accordance with applicable state law.

2.1.11. Proposed Reclamation

Section 2.1.11 is a summary of the Reclamation Plan prepared by Glamis Imperial for the Imperial Project, which is provided as Appendix A to this joint EIS/EIR. Those readers wishing more detailed information on the Reclamation Plan proposed by Glamis Imperial are encouraged to read Appendix A in its entirety.

2.1.11.1. Reclamation Goals

Glamis Imperial has proposed to conduct reclamation activities in accordance with SMARA and the regulations found at 43 CFR 3809.1-3(d) and 14 CCR 3500. In general, the proposed Reclamation Plan includes measures for: protecting wildlife and the public; minimizing erosion and mass failure potential; demolishing structures and neutralizing process components; regrading selected side and cut-and-fill slopes; revegetation; and, where feasible, providing for the resumption of pre-mining land uses.

The proposed post-mining reclamation goals are to: reclaim the Project mine and process area to a stable, functioning landscape unit/ecosystem to allow for similar land uses as currently exist; establish conditions that would promote the long-term development of a vegetation community typical of the local area; and produce reclaimed areas that are visually and functionally compatible

with the surrounding topography. Implementation of the proposed Reclamation Plan would not limit the future development of mineral resources in the area, although some mineralization may be concealed after placement of waste rock in the West and Singer Pits. Currently uneconomic precious metal resources within the walls and floors of the East Pit would remain largely accessible for future development. In addition, material in the waste rock stockpiles would be available for future development.

The Reclamation Plan relies primarily on natural processes and requires little intervention once preparation is complete. Reclamation procedures, as stated in the Reclamation Plan, are to:

- *Establish stable topographic surfaces and drainage conditions that are compatible with the surrounding landscape and serve to control erosion.*
- *Regrade waste rock stockpiles and the leach pad slopes to no greater than 2H:1V and install catchment basins to promote revegetation.*
- *Backfilling the West Pit and Singer Pit.*
- *Provide a technical review of the groundwater flows and levels encountered in the East Pit. If the results of the review indicate a pit lake may form, backfill that portion of the floor of the East Pit to above the level of any projected pit lake.*
- *Establish, on waste rock stockpiles, haul roads, pit bottoms and facilities, soil conditions conducive to a stable plant community through grading and reapplication of suitable growth material containing seeds.*
- *Revegetate disturbed areas using native plant species endemic to the area in order to establish a long-term productive biotic community compatible with proposed post-mining land uses and capable of self-regeneration without the long-term dependency on maintenance, soil amendments, or fertilizers, including;*
    - *Planting and transplanting young ironwood (Olneya tesota), palo verde (Cercidium floridum) trees or seedlings and shrub species along the channels which divert the throughgoing washes to reestablish the microphyll woodland habitat in acreage roughly equivalent to that acreage currently found along these channels within the Project mine and process area;*
    - *Transplant ocotillo, barrel cactus and species of cholla into catchment basins;*
    - *Adding seeds of the California Native Plant Society (CNPS)-listed, but locally common, endemic fairy duster (Calliandra eriophylla) and winged forget-me-not (Cryptantha holoptera) to the revegetation seed mix.*

For specific details on the reclamation methods and ultimate physical condition of the Project mine and process area, see Section 6.6 of the Reclamation Plan.

The reclamation effort would consist of different methods to be applied, as appropriate, to reclaim different types of surface disturbance (see Table 2.3). Figure 2.11 shows which areas of the Project mine and process area would be subject to the specific reclamation methods outlined above.

2.1.11.2. Reclamation Activities

The reclamation plan addresses all surface disturbance created by the Project. In general, the reclamation plan includes measures for: protecting wildlife and the public; minimizing erosion and mass failure potential; demolishing structures and neutralizing process components; regrading selected side and cut-and-fill slopes; revegetation; and, where feasible, providing the resumption of pre-mining land uses. The post-mining reclamation goals at the Project are to reclaim the area to a stable, functioning landscape unit/ecosystem to allow for similar, but not identical, land uses, including wildlife habitat and recreation, as currently exist, consistent with the applicable reclamation standards of the California Code of Regulations, Article 9, Title 14 (Reclamation Standards), and the surface management regulations under the general mining law found in the Code of Federal Regulations, Title 43, Group 3800. The final land forms of the Project mine and process area cannot be reclaimed to the original contours. Thus the goal of the Plan is not to restore and revegetate to the original land form, but to a natural state that blends in with the existing undisturbed terrain.

The reclamation effort consists of different methods to be applied, as appropriate, to reclaim different types of surface disturbance. These methods are the construction and reclamation of diversion channels; demolition of structures and removal of facilities; rinsing and neutralization of residual leach solution in the solution ponds and heap; backfilling of selected pit(s); the construction of boulder barricades for public safety and to exclude vehicle access; design and construction of stable slopes; rough regrading; surface preparation through fine grading, ripping to loosen soil, topsoiling, and/or construction of water catchments for vegetation; tree and cactus transplantation; reseeding and revegetation; or natural revegetation.

Table 2.3: Reclamation Methods to be Applied to Areas Disturbed Within the Mine and Process Area

MINE FACILITY COMPONENT		RECLAMATION METHODS TO BE APPLIED									
		STRUCTURE DEMOLITION FACILITY REMOVAL	NEUTRALIZATION	VEHICLE ACCESS EXCLUSION	SLOPE STABILIZATION	REGRADING	SURFACE PREPARATION	BACKFILL	NATURAL VEGETATION	REVEGETATION	TRANSPLANT VEGETATION
Mine and Process Area											
Pits	West & Singer Pits (see also Waste Rock Stockpiles)					X	X	X		X	
	East Pits-Bottom			X			X			X	
	East Pits-Slopes			X	X				X		
Process Facilities	Heap Leach Pad-Top		X			X	X			X	
	Heap Leach Pad-Slopes		X		X	X	X			X	X
	Process Facility Area (Solution Ponds and Process Facilities)	X	X			X	X			X	
	Lime Bin Area and Fresh Water Pond	X				X	X			X	
Waste Rock Stockpiles	Waste Rock Stockpiles-Top				X	X	X			X	
	Waste Rock Stockpiles-Slopes				X	X	X			X	X
Topsoil Stockpiles	Soil Stockpiles Sites					X	X		X		
Support Facilities	Office/Maintenance/Parking/Emergency Power Area	X				X	X			X	
	Haul and Maintenance Roads					X	X			X	
	Drainage Diversions					X	X			X	X
Ancillary Area											
County Road Realignment-Temporary						X	X			X	
Powerline, Water Wells		X				X	X			X	
Pipeline Route						X	X			X	

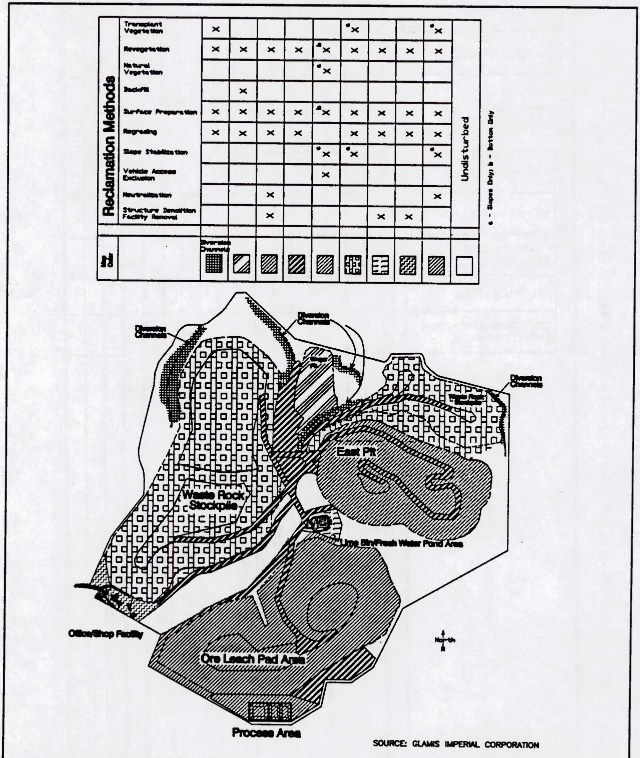

Figure 2.11: Reclamation Methods Applied Within the Mine and Process Area for Major Project Components

Concurrent Reclamation:

Concurrent reclamation activities would begin with construction of the necessary diversion channels, and the stabilization and erosion control of the soil stockpiles during the construction phase of the mine and leach pad complexes. During initial construction, constructed diversion channels would be reclaimed with soil, vegetation and trees removed from existing wash areas disturbed by Project-related construction. As operations progress, areas no longer needed for mining activities become available for concurrent reclamation. Concurrent reclamation would focus on the stable diversion of surface water, as well as the stabilization of new or upgraded access roads, side and final cut-and-fill slopes, and final waste rock stockpiles. The interim reclamation of soil stockpiles generally consists of grading for stabilization and allowing natural germination from seeds present in the soil. Soil stockpiles would be placed in field determined locations away from washes that provide protection from water erosion. The sandy and stony nature of the soils would prevent significant wind erosion after placement. Large trees and shrubs would either be removed and appropriate specimens transplanted before soil stripping, or buried in soil stockpiles and waste rock stockpiles. Small shrubs and surface litter including seeds would be incorporated into the soil stockpiles. Roads constructed for drilling may be reclaimed concurrent with mining operations when it is determined that the roads are outside the influence of further geological surveying or mining operations.

Reclamation of the diversion channels would be done concurrently with diversion channel construction. Reclamation of the remainder of the disturbed areas would be initiated when individual components are no longer required for mine operations or when facilities are decommissioned and closure begins. Removal of facilities, rough grading, and scarifying activities may occur at any time during the Project life.

Closure and Post-Closure Reclamation:

Closure and post-closure reclamation would commence when the ore reserves are exhausted and mining has ceased. Leaching operations would cease after uneconomic recovery rates are reached. It is foreseeable that the heap leaching activities would remain active after mining activities have stopped, due to the length of time required to complete leach cycles. In this case, open pit and some related facility reclamation and closure activities would occur in advance of leach pad reclamation and closure.

It is estimated that the closure and post-closure phase of reclamation would take one (1) to three (3) years to complete following cessation of leaching. Post-closure monitoring of revegetation success is expected to account for an additional five (5) years.

2.1.11.2.1. Backfilling and Grading

Waste rock and overburden would be placed on waste rock stockpiles adjacent to the pits or, as mining proceeds, into the previously mined-out West Pit and Singer Pit. The West Pit and Singer Pit would be backfilled. Subsequent backfill may be necessary to raise the floor of the East Pit to a level higher than the level of any pit lake which may be eventually predicted to form from the inflow of ground water.

During active mining, reclamation in and around the open pits would be limited to controlling erosion of the haul roads and slopes. Upon the completion of mining and any appropriate or necessary backfilling, the remaining open pits would be reclaimed by regrading (and revegetating) the haul roads and floors and leaving the slopes in a stable condition. Stable angles of the final pit highwalls would be determined by an engineering analysis which would be completed after one full year of mining in each of the West Pit and East Pit. Results of these studies would then be incorporated into open pit designs.

All disturbed areas except the open pit slopes would be regraded and revegetated, when no longer required for mine operations. This reclamation would create undulating land forms that are stable, do not allow for any pooling or ponding of water, and blend with the surrounding undisturbed topography. Final regrading on the tops and accessible slopes of the waste rock stockpiles and the leach pad, the bottoms of the open pits, the haul roads, and the areas disturbed for the soil stockpiles would be conducted to minimize erosion potential and additional surface disturbance and facilitate the establishment of post-mining vegetation. Sharp edges would be rounded and straight lines altered to provide contours which are visually and functionally compatible with the surrounding terrain. In addition, regrading would entail the construction of small catchment basins to facilitate the revegetation of the disturbed areas. Regrading of other areas disturbed by facilities and roads would be fine-graded to enhance moisture retention for reclamation and revegetation.

2.1.11.2.2. Stable Slopes

Stable topographic surface and drainage conditions would be established that would control erosion, prevent sedimentation, and be compatible with the surrounding landscape. Slopes would depend on the type of material, material erodability, and the practical considerations of the mining process. Overall pit slopes would range from: 0.8H:1V (40 degrees) to 1H:1.2V (50 degrees); 2H:1V (30 degrees) for waste rock stockpile slopes; 2H:1V (30 degrees) for leach pad slopes; and near-flat along the tops of waste rock stockpiles, heap, haul and maintenance roads, and pit bottoms.

Pit wall slopes would be constructed during mining at angles consistent with long-term stability. Engineering analysis and the experience of Glamis Imperial's sister company, Chemgold, Inc. at the Picacho Mine, indicates that the slope of the ultimate pit walls would be 40 degrees to 50 degrees to provide the required factor of safety for long-term slope stability. Each pit is to be developed in separate phases, which allows verification of slope stability parameters. In addition, after one full

year of mining in each of the East Pit and West Pit a slope stability analysis would be performed. Results of the study for each pit would be incorporated into the design of that open pit. Due to the limited depth, size, and life of the Singer pit (less than 6 months), no additional slope stability analysis is planned for the Singer Pit.

Pit walls would have safety benches at regular vertical intervals to contain minor rock spills. Pit wall slopes may increase if actual mining conditions and geotechnical factors indicate that pit wall integrity could sustain steeper slopes. After closure, pit highwalls remaining in areas not utilized for waste rock stockpiling would be left in a stable configuration, subject to natural processes, and barricaded with large boulders around the rim of the pit to prevent vehicular access and discourage pedestrian access by the public over slopes which could constitute a hazard. The barricade would consist of boulders averaging approximately four (4) feet in diameter, which would be stacked into a continuous wall no less than eight (8) feet high. This "wall" would be set back from the edge of the pit by no less than 100 feet. In addition, the uppermost ten (10) feet of the pit slope would slope no greater than 2H:1V (30 degrees), and would terminate at its lower side into a horizontal bench no less than ten (10) feet wide.

Overall final slope grades of the waste rock stockpiles would not exceed 2H:1V (30 degrees). Upon final mine closure, the tops and accessible slopes of the waste rock stockpiles would be rough-graded and ripped to prevent water pooling, ponding, and erosion, and to create small catchment basins to facilitate the revegetation of the disturbed areas. Stockpiled soil material would be distributed on the tops and the accessible level portions of the waste rock stockpile prior to broadcast seeding with the proposed seed mixtures.

The heap would be constructed with no greater than 2H:1V (30 degree) overall slopes to provide for final reclamation. The sharp contours of the top and bottom of the leach pad would be rounded and softened, and the graded material extended outward far enough to overlap the perimeter berm that encircles the leach pad during active operations. Grading of the pad would leave in place the interceptor ditch around the pad, thereby diverting all runoff away from the pad area. Upon final mine closure, the top and slopes of the leach pad would be rough-graded and ripped to prevent water pooling, ponding, and erosion, and to create small (4,000 to 5,000 square foot) catchment basins to facilitate the revegetation of the disturbed areas.

2.1.11.2.3. Drainage Reestablishment and Erosion Control

All surface drainages in the area are ephemeral, with flows occurring only during and following major precipitation events. Those sections of these existing washes which could convey storm waters around or through the Project mine and process area without impacting Project facilities would not be altered by the Project and would continue to carry storm flows through and around the Project mine and process area. However, several of these ephemeral drainages must be permanently diverted around the facilities located within the Project mine and process area. Each of the diversions has

been designed to direct water back into the same major drainage system from which it was diverted. At no time would flows be diverted into other major drainage systems.

All diversion channels have been designed to safely convey all runoff flows from the 100-year, 24- and 6-hour precipitation events, and would be built to approximate the original drainage system gradient and channel geometry. During the period that the pits are open, the diversion channels may be temporarily lined with high density plastic or cement grout and protected by rip rap to prevent subsurface flows into the open pits. Areas of the diversion channels not lined would be reclaimed concurrent with initial diversion channel construction. All diversion channels would re-connect with the same wash system at a point just downstream of the open pits. Additionally, any areas of the diversion channels which may be especially susceptible to erosion from surface flows would be bermed and/or rip-rapped to prevent erosion and potential damage during the period when the pits are open. All bermed and/or rip-rapped areas would be maintained while the open pits are being mined to prevent wash erosion. Diversion channel slopes and banks would have suitable microphyll woodland species directly relocated from the disturbed drainage and would be selectively planted with young ironwood and palo verde trees or seedlings to begin to reestablish microphyll woodland habitat.

To minimize erosion and the production of sediment, all undisturbed areas and adjacent ephemeral wash vegetation which is not to be directly impacted by the construction of Project facilities would be left intact and undisturbed. To minimize impacts from erosion on the Project area and down surface-gradient areas, all mine facilities, such as the heap leach facility, waste rock stockpiles, soil stockpiles, and roads, would be designed and constructed with appropriate erosion control features designed to meet the performance standards of 14 CCR 3706. Additionally, in accordance with the Storm Water NPDES General Permit requirements, Glamis Imperial would prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which is a site-specific plan to control drainage and erosion. Surface runoff and drainage from disturbed areas within the Project mine and process area would be controlled, collected, conveyed to sediment basins, and infiltrated (or consumed in mining or the heap leach process).

Methods to be employed, if necessary, to reduce or prevent the generation of sediment from within the Project mine and process area would include berms, sediment ponds, rip rap, check-dams, sand bags, silt fences, or other temporary techniques to minimize impacts. All surface runoff generated from disturbed areas within the Project mine and process area would be collected in the active pit(s), collected in the heap leach system and added to the process solution volume, or collected and directed to sedimentation basins for infiltration. No runoff from disturbed areas within the Project mine and process area would be directed into the existing drainage system during the life of the Project. Erosion control methods would be designed to handle in excess of a 20-year/one-hour intensity storm event, in accordance with standards established by 14 CCR 3706(d) (SMARA regulations).

2.1.11.2.4. Structure Demolition and Facility Removal

The main haul roads and all other Project roads, including roads constructed for drilling holes for geological surveying, and abandoned sections of the county road within the mine and process area would be regraded, scarified, and revegetated. The relocated section of Indian Pass Road would be reconstructed adjacent and parallel to the West Pit West Diversion channel following the completion of backfilling of the West Pit.

Buildings and ancillary facilities would be reclaimed by having all portable and salvageable structures removed and taken off-site. Any permanent below-grade structures and all foundations would be removed. All surplus materials, storage containers and trash would be transported to a landfill authorized to accept this material. The remaining waste products, and all surplus fuel oil and other materials, would be removed from the Project mine and process area and disposed of according to then-current state and federal regulations.

The on-site electric substation, the 92 kV/13.2 kV transmission line, and the ground water well pumping facilities would be removed following the completion of reclamation of the Project mine and process area. Areas disturbed during powerline construction within the project ancillary area would be reclaimed shortly after the powerline is in place, and again after removal. The overbuilt 92 kV/34.5 kV transmission line, owned by the IID, would remain in place. Disturbed areas created by overbuilding the 92 kV/34.5 kV line which would not be used for regular maintenance would be raked shortly after the powerline is constructed and naturally revegetated.

Ground water production and monitoring wells would be plugged and abandoned in conformance with applicable regulatory requirements (14 CCR 3713(a)). The buried ground water pipeline from the ground water well field to the Project mine and process area would be abandoned in-place. The buried water pipeline construction corridor would be reclaimed after pipeline installation is completed.

Fencing constructed for Project operations would be maintained in-place until revegetation is completed and determined successful for bond release by the BLM and Imperial County. At that time, fencing would be removed.

2.1.11.2.5. Contaminant Control

The leach pad and process ponds would be designed as lined, zero-discharge facilities with leak detection systems, in conformance with CRWQCB requirements. The process ponds, and storm water overflow pond, would be designed with sufficient capacity to contain the normal operating volume of solution, together with the rainfall run-off from the heap following a maximum probable one (1)-hour storm event occurring simultaneously with a 24-hour power outage, while maintaining a two (2)-foot freeboard. Process chemicals would be stored in secured areas in weather-proof containers, in accordance with local, state and federal regulations and company safety policies.

At the completion of leaching, the spent ore on the heap leach pad and sediment contained within solution ponds would be neutralized, regraded, and small catchment basins installed and seeded. Prior to initiation of reclamation, neutralization of the heap leach pile would be accomplished by rinsing with fresh water to reduce cyanide levels to meet the requirements of the WDRs to be issued by the CRWQCB before use of the leach facility can commence. A neutralizing agent may be added to the process waters and rinse solutions to reduce the cyanide level to meet CRWQCB standards. Sampling and laboratory testing would be conducted to evaluate and verify completion of the neutralization process at the conclusion of heap rinsing. This would likely require twelve (12) months of rinsing (based on Chemgold, Inc.'s experience to date with the successful closing of four (4) heaps at the Picacho Mine).

All neutralized process waters and rinse solutions would be evaporated in the ponds or by sprinklers on the heaps, or land applied. Process water ponds would then be reclaimed, but the final neutralization and reclamation of the ponds would not occur until the neutralization of the heaps is complete to the satisfaction of the CRWQCB.

Any soil material contaminated by spills of regulated waste materials, such as fuel oil, waste lubricants or gasoline, would be collected, contained, and either remediated within the Project mine and process area (if permissible under then-current regulations) or removed and disposed of in conformance with then-current regulations.

To ensure containment of sediment erosion during mining, several sediment traps have been designed around the waste rock stockpiles to contain the sediment and runoff which may be generated by the 100-year, 24-hour storm event. Sediment from surface runoff from the Project facilities would be contained on-site. Project surface runoff would remain separated from throughgoing runoff flow in the diversion channels during the life of the Project.

2.1.11.3. Revegetation Activities

Revegetation activities would include: salvaging and stockpiling of available soil; contouring and shaping accessible disturbed areas; reapplying soil materials as necessary; preparing seedbeds; seeding and transplanting; optimizing seed mixtures and rates by using locally collected seed; conducting revegetation test plots; and monitoring and reporting.

2.1.11.3.1. Soil Salvage and Stockpile

Most of the Project mine and process area is located on old piedmont surfaces consisting principally of desert pavement which has a poorly developed soil profile and which is not suitable for salvage and use in reclamation. However, a few areas within the Project mine and process area, principally in the shallow washes and adjacent slopes, have shallow soils with suitable texture which can be salvaged. Stripping of these soils to the greatest depth practicable (generally 12-18 inches) would lead to the salvage of an estimated maximum of 112,200 cubic yards of soil. Salvaged soil would

be stockpiled at two (2) soil stockpile sites. Construction of the stockpiles would be done to enhance stability of the side slopes and divert surface run-on. Best management practices (BMP) would be used to contain any sediment which may be liberated due to precipitation directly on the soil stockpiles.

2.1.11.3.2. Contouring and Grading

All disturbed areas except the pit slopes would be regraded and revegetated, when no longer required for mine operations. This reclamation would create undulating land forms that are stable, do not allow for any pooling or ponding, and blend with the surrounding undisturbed topography. Final regrading on the tops and slopes of the waste rock stockpiles and the leach pad, the bottoms of the open pits, and haul roads would be conducted to minimize erosion potential and facilitate the establishment of post-mining vegetation. Sharp edges would be rounded and straight lines altered to provide contours which are visually and functionally compatible with the surrounding terrain. Final regrading would entail the construction of catchment basins to facilitate the revegetation of the disturbed areas.

Rough grading would blend the top edges and crests of the waste rock stockpiles and the heap and would be used during the construction of the diversion channels. Final grading would construct the small catchment basins for revegetation on the waste rock stockpiles and leach pad. Potential drainage and erosion processes would be important considerations in the design for shape and size of these small catchment basins. In general, most flat or gently sloping areas, less than 2H:1V slopes, would have catchment basins constructed on them. This would include the entire leach pad and waste rock stockpiles.

2.1.11.3.3. Revegetation Test Plots

In order to provide the basis for specific reclamation methods and techniques which would be used at the Project, revegetation test plots would be set up early in the mine life. The objective of the test plot program is to provide long-term plots which would be evaluated throughout the mine life, and to utilize test plot results to modify and continue developing reclamation methods.

All revegetation treatments would be based on the Project test plots developed for the site-specific conditions of the Project area. Treatment may be the same as have been used elsewhere, such as at American Girl or Picacho Mines, but would be designed for environmental conditions specific to the Project. Ongoing monitoring of Picacho Mine reclamation, and Imperial Project concurrent and interim reclamation, would provide additional information for refining the Project seeding and revegetation plan, which would be updated with new information subject to the concurrence of the BLM and Imperial County, prior to the start of final reclamation and decommissioning of the Project area.

Revegetation testing would be conducted during the life of the Project when areas become available. A seed collection program was initiated in 1996 and would continue to be conducted periodically throughout the life of the Project. This would provide a seed bank of native, acclimatized vegetation for the revegetation effort. To aid in the revegetation of the Project mine and process area, the naturally vegetated areas between the disturbed areas, such as between roads and pits and the undisturbed, fenced portion of the central wash, would be managed as undisturbed buffers to serve as a natural seed sources and provide protection for small mammals, birds, and reptiles.

2.1.11.3.4. Soil Reapplication

A minimal amount of useful soil (growth media) exists within those portions of the Project mine and process area to be disturbed. However, salvaged and stockpiled soils which remain after completion of diversion channel reclamation would be distributed as equitably as possible to all the areas to be revegetated. Revegetation experience at the Picacho Mine indicates that the neutralized leached ore on the heap is excellent in-place growth media. Based on this experience, little or no soil is needed on the leach pad to achieve revegetation success. With that in mind, the remaining stockpiled soil would be used as needed to reclaim waste rock stockpiles, haul roads and ancillary facilities areas.

Where necessary, areas of compacted material would be ripped prior to application of the salvaged soil. Soil would be placed on prepared areas in the early fall or immediately after final grading, just prior to seeding. Soil placement would be monitored to ensure that a sufficient depth of material is being placed. The surface would be left in a rough or furrowed state to reduce wind and water erosion and to increase available moisture in the surface soil layer.

2.1.11.3.5. Seedbed Preparation

Following catchment basin construction, stockpiled topsoil placement and final grading, seedbed preparation, seeding, and transplant efforts would be performed as follows:

- Compacted surfaces would be loosened and left in a rough condition by ripping.
- The surfaces would be contoured into catchment basins which enhance moisture, promote seed germination and plant growth, and provide for stabilization of the surface material from wind and erosion.

2.1.11.3.6. Seeding, Planting and Transplanting

The intended seeding mixture would be collected from the natural sources located on surrounding areas and the Project area. The revegetation seeding rates recommended would be based on test plots from the Project, the Picacho Mine, and in consultation with the BLM, Imperial County, and the California Department of Fish and Game (CDFG) (as to deer browse). Glamis Imperial, or Glamis Imperial's contractors, would collect, prepare, and store native seed for use in reclamation. During

final reclamation, the seed mixture would include native plant seeds collected in the local area designed to increase available browse for deer. Any substitutions to the approved native seed would require reapproval by the BLM and Imperial County prior to use.

Surface conditions for sowing seed are best immediately after surface preparation and/or soil placement since the surface is loose and friable, allowing the seed to be covered with no raking or harrowing. Seeds would be hand broadcast, or broadcast by rotary spreaders. For broadcast applications, equipment such as a "cyclone" spreader would be used to distribute collected seed immediately after grading, when surfaces are rough. The rate of sowing would be adjusted, by volume, depending on the visible seeds present. Generally, about one-half (½) cup of seed-containing material per catchment basin would be used, which is estimated at a rate of which about 8 to 10 pounds of native seed per acre.

Plants deemed valuable for transplanting that meet the transplant criteria outlined in the Reclamation Plan, such as cactus, ocotillo, young ironwood and palo verde trees, would be collected from those areas of the Project area schedule for surface disturbance prior to surface disturbance. Additionally, seedlings of some species may be grown from seeds collected from the area or equivalent sources. These plants would be carefully placed into prepared locations. Selected cacti species which occur within the disturbed areas of the Project area would be transplanted to a holding area south of the leach pad within the Project mine and process area. The holding area would serve to temporarily hold plant specimens prior to placement during final reclamation. The holding area would be sized to hold approximately 250 transplant specimens. The area would be prepared using salvaged soil and would be watered as necessary.

2.1.11.3.7. Schedule

Soil distribution and revegetation activities are limited by the time of year during which they can be effectively implemented. Table 2.4 outlines the anticipated annual revegetation activities schedule on a monthly basis which would be followed to achieve the reclamation goals and adequate revegetation. Site conditions and/or yearly climatic variations may require that this activities schedule be modified to achieve revegetation success.

Table 2.4: Anticipated Reclamation Activities Schedule

TECHNIQUES	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
Soil Distribution												
Regrading/Seedbed Preparation												
Seeding												
Transplanting from Storage												
Note: Regrading, transplanting or seeding activities could occur year round.												

By sowing seed and planting in the fall/winter and utilizing the available soil moisture accumulated during winter, growth would be encouraged for most seeds in the seed mix of endemic species. Two kinds of germination are common: (1) fall or winter annuals and shrubs; and (2) spring or early summer germinators, generally shrubs and trees. Some native plant seed have been observed to germinate at any time of year after a substantial rain. Reclamation has a better chance for success in years with average and above-average precipitation, especially if adequate moisture is available during the November through April time period.

Milestone dates for the completion of certain mining and reclamation activities are presented in Table 2.5. The completion dates of the various elements shown are based upon final completion of leaching, neutralization of the heap, and mining activities. Early or late completion dates in any of the activities for a leach pad would result in a corresponding change in the timing of the subsequent dates.

Table 2.5: Reclamation Milestone Schedule

YEAR	RECLAMATION ACTIVITIES PLANNED
1	• West Pit diversion channels installed and concurrently reclaimed. • Remaining West Pit area soils salvaged and stockpiled. • Sediment catchment basins installed around Project facilities. • Selected plant specimens transplanted to temporary holding area. • Transmission line and water pipeline areas reclaimed.
2	• Reclamation test plots installed in wash habitat. • West pit slope stability reanalyzed.
3	• Singer Pit and East Pit East diversion channels installed and concurrently reclaimed. • Singer Pit and East Pit area soil salvaged and stockpiled.
4	• East waste rock stockpile completed with revegetation test plots. • Selected plant specimens transplanted to temporary holding area. • East pit slope stability reanalyzed.
5	• Backfilling West Pit completed. • Revegetation test plots and reclamation on south slopes of the South waste rock stockpile started.
6	• Singer Pit backfill completed. • East Pit West diversion channel installed and concurrently reclaimed. • East Pit West wash channel area soil salvaged and stockpiled.
6-10	• On-going reclamation testing and monitoring. • Indian Pass Road returned to location parallel to and east of the West Pit West diversion channel. • Relocated portion of Indian Pass Road reclaimed.
10-15	• Heap leach facility neutralized • Initial heap leach pad reclamation. • Slopes reduced, catchment basins installed, and undulating land forms constructed on South waste rock stockpile.
15-20	• Final reclamation of heap leach pad. • All remaining facilities removed and/or reclaimed. • Reclamation success monitored and final bond release.

2.1.11.3.8. Weed Control

Weed control in this extreme desert climate has not proven to be a problem at the nearby Picacho Mine or at other mines in the Cargo Muchacho Mountains. As the revegetation process progresses, the natural succession of species would tend to foster those species best adapted to a particular site. Weed species in revegetated areas would be managed when they threaten the success of the proposed reclamation and to prevent spreading to nearby areas. Tamarisk is known to invade wet areas around pits, sediment ponds, and leach pads and, as such, would be actively controlled throughout the mine life by an on going effort to eradicate any seeding or observed growth. The vicinity of the Project

area is not considered a substantial source of tamarisk seed as compared to drainages in and around the Colorado River. Based on the extent of the problem, selective spraying with a herbicide would be considered, subject to BLM approval.

2.1.11.4. Monitoring and Reclamation Success Evaluation

2.1.11.4.1. Vegetation Monitoring

The goal of the revegetation program is to establish a vegetative cover over the reclaimed area that promotes a productive ecosystem and establishes conditions that promote the long-term development of a vegetative community typical of the local area. This depends upon creating a stable situation that would promote the long-term development of a vegetation community typical of the local area. Vegetative cover (the vertical projection of the crown or shoot area of a species to the ground surface expressed as a percent of the total reference area), vegetative diversity (the distribution and abundance of different plant species within a given reference area), and vegetative density (the number of individuals or stems of each species rooted within a given reference area) can be used as the monitoring parameters.

To determine if the revegetation efforts are successful, comparisons would be made between revegetated sites and sites not disturbed by mining activities. To ensure that the analysis of the undisturbed vegetative community would be statistically valid to within an 80 percent confidence interval, vegetation parameters for density and diversity of the perennial herbaceous and shrub species would be sampled in washes, slopes and desert pavement areas adjacent to proposed disturbed sites. At the time of sampling for bond release, concurrent and comparable monitoring would be conducted in the same years on undisturbed sites and reclaimed areas within the Project area.

Separate standards for wash and upland vegetation types would be established. Trees removed due to the construction of the diversion channels would be replaced by transplantation or seedlings at the natural density as indicated by baseline studies of the washes. Standards for wash revegetation would be based on results collected from off-site transects in the washes surrounding the project. Standards for upland revegetation would be based on results from off-site transects on slopes and desert pavement. Glamis Imperial proposes that the standard for the reclaimed surfaces be set at a percentage of density and diversity of selected, similar, adjacent vegetation measured in comparable areas. Reclamation efforts would be considered successful when the results of revegetation monitoring show that there has been an establishment of 30 percent or more of the of vegetation density and 33 percent or more of vegetation diversity of the perennial species in the monitored reclaimed and revegetated areas, as compared to the off-site similar vegetation for two (2) consecutive years. Annual and perennial plant cover (canopy cover) is not proposed as a reclamation standard. However, this important plant parameter would be measured during monitoring to determine the forage yield and relative ecological health of the reclaimed areas.

In the event of initial failure of the revegetation, Glamis Imperial would consult with the BLM and Imperial County regarding remediation alternatives and revegetation measures that should be undertaken.

2.1.11.4.2. Reporting

An annual report summarizing the findings of the monitoring program would be submitted to the BLM and Imperial County each year following the commencement of monitoring. The report would include the acreage disturbed and reclaimed for the current year as well as for the project to date, and the remaining acreage to be disturbed and reclaimed. In addition, the annual report would document the reclamation activities, successes, and failures. Information obtained during the previous year's reclamation activities would be reviewed, and any proposed modifications to the Reclamation Plan or bonding requirements would be presented for approval by the BLM and Imperial County.

2.1.11.5. Financial Assurance

To establish an acceptable bonding instrument for the BLM, Imperial County and the California Department of Conservation, Glamis Imperial would post a bond for an amount consistent with the applicable portion of the calculated physical reclamation cost estimate of approximately \$700,000.00, subject to agency review and approval (see Appendix A). Separate financial assurance, currently estimated at a total of approximately \$2,040,000.00, would be posted with the CRWQCB to meet that agency's bonding requirements to cover the applicable costs of neutralization of the heap. All bonding would also conform with regulation 43 CFR 3809.1-9.

2.1.12. Other Environmental Impact Reduction Measures

Glamis Imperial has proposed the following additional environmental impact reduction measures which have not otherwise been identified above:

- Purchase of off-site tortoise mitigation land within designated critical habitat at an area ratio of 1:1, for a total of approximately 1,631 acres.

- Purchase of off-site microphyll woodland habitat to replace, at an area ratio of 3:1, those acres of microphyll woodland habitat disturbed within the footprint of the Project mine and process area, for a total of approximately 261 acres.

- Installation of three (3) wildlife guzzlers off-site in the general vicinity of the Project area, and one (1) within the microphyll woodland mitigation land, to enhance the use of habitat by the local deer herd. These guzzlers would be at locations agreed to by the CDFG and, if located on public lands managed by the BLM, the BLM.

- Construction following the completion of reclamation of one (1) wildlife guzzler within the Project mine and process area in a design and location acceptable to the BLM and the CDFG to enhance the area as habitat for deer and other wildlife.

- Development, with the concurrence and assistance of the BLM, of a Memorandum of Agreement (MOA) covering additional off-site reclamation mitigation. This MOA would be written to provide, at a 1:1 compensation ratio, reclamation of agreed to areas equal to the unreclaimed slopes of the East Pit (approximately 165 acres). This MOA would cover, in general, reclamation of old mining activity, closed trails, and historic disturbance within the BLM, El Centro Resource Area inventory of sites.

- Planting of ironwood seedlings in the central wash, and along the drainage that forms the eastern boundary, of the Project mine and process area, to replace those ironwood trees that were historically harvested by others. Trees would be replaced at a 1:1 ratio. These trees would be initially protected with a wire cage, and during the initial (2) years of growth would be slug-watered occasionally to facilitate survival.

- Conducting annual transect surveys of the major through-going ephemeral stream channels upstream and downstream of the Project mine and process area to monitor these drainages with respect to existing vegetation and microphyll woodland habitat.

- Construction of a four (4)-foot high, three (3)-strand smooth wire fence with tortoise-proof fencing at the bottom around the south-central portion of the central wash within the Project mine and process area to prevent accidental surface disturbance of the microphyll woodland habitat in this internal area by Project activities during mine construction and operation.

- Documentation of any potentially adverse erosional or depositional processes, and documentation of any sightings of deer fawn, bighorn sheep, bobcat, kit fox, puma, or any other important wildlife species, by Project personnel.

- Purchase of 12 infrared trip cameras and one (1) pair of night vision equipment for the Imperial Valley Office of the CDFG to help study the impacts of wildlife guzzlers on local wildlife, as well as developing data on the local deer population dynamics.

- Maintenance of Indian Pass Road from Ogilby Road to the north side of the Project mine and process area through the life of the Project.

- Design of the Project surface-disturbing activities, to the extent possible, to avoid direct impacts to the prehistoric cultural features identified within the Project mine and process area.

- Preparation of a hazardous material spill/release contingency plan which provides appropriate training to all Project employees on the proper response to potential chemical releases.

2.2. Alternatives to the Proposed Action

NEPA (42 USC §4332(E)) requires that an EIS "... study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." Chapter V, Section B.1.e.(2) of the BLM NEPA Handbook directs that "... reasonable alternatives to the proposed action - including the no action alternative which reflects continuation of the current management practices or denial of the action - must be defined." This section of the BLM NEPA Handbook continues by stating that "Each alternative, except for the no-action alternative, should represent an alternative means of satisfying the identified purpose and need and of resolving issues. The rationale for considering but not selecting for further analysis certain suggested alternatives must be documented, especially those suggested by the public or other agencies." EIS preparers are directed to "Consult program-specific guidance for additional requirements on alternatives."

The CEQA Guidelines (14 CCR §15126(d)) direct that an EIR must "Describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." 14 CCR §15126(d)(2) also states that "The EIR should briefly describe the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination." 14 CCR §15126(d)(3) directs that "The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project."

The CEQA Guidelines (14 CCR §15126(d)(5)) go further to determining the range of alternatives to be considered in an EIR. "The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objective of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making." 14 CCR §15126(d)(5)(B)2. concludes the guidance with the statement that "If the lead agency concludes that no feasible alternative locations exist, it must disclose the reasons for this conclusion, and should include the reasons in the EIR. For example, in some cases there may be no feasible alternative locations for a geothermal plant or mining project which must be in close proximity to natural resources at a given location."

The analysis of possible alternatives to the Proposed Action which follows utilizes the following information:

- Section 1.7 describes the Glamis Imperial's purpose and objectives for the Proposed Action: to profitably recover as much of the precious metals discovered on those mining claims which it owns in the Project mine and process area as possible; and to fully exercise its rights under the General Mining Law of 1872.
- As discussed in Section 1.6.1, the General Mining Law of 1872 grants a person who discovers valuable mineral deposits the right to extract and sell these minerals. BLM program-specific guidance is given in Section 302 of FLPMA and BLM regulations for surface management of public land being mined under the general mining law, which specifically recognizes the statutory right of mineral claim holders such as Glamis Imperial to explore for, and develop, federal mineral resources.
- Residual significant affects of the Proposed Action consist of the following:
  - Significant direct and indirect adverse affects to certain prehistoric and historic cultural features located within the Project area which were determined to be eligible for the National Register of Historic Places because they are associated with events that have made a significant contribution to the broad patterns of our history or embody the distinctive characteristics or a type, period, method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;
  - Significant, adverse impacts to the Indian Pass-Running Man Area of Traditional Cultural Concern (ATCC) and the Trail of Dreams which, according to knowledgeable Quechan Tribe representatives, would destroy their ability to use the Indian Pass-Running Man ATCC and Trail of Dreams for religious and educational purposes; and
  - The significant adverse effects on visual resources from the Project features located within the Project mine and process area (principally the waste rock stockpiles, heap, and open pit).

2.2.1. West Pit Alternative

The reduced project alternative which would create the smaller amount of total surface disturbance within the boundaries of the Project mine and process area would be the mining of only the West Pit and Singer Pit. This West Pit Alternative would produce a total of approximately 150 million tons of mined material (33 percent of that produced under the Proposed Action), of which approximately 60 million tons would be ore and approximately 90 million tons would be waste rock (approximately 40 percent of the ore and 30 percent of the waste rock, respectively, of that produced under the Proposed Action) [Personal Communication, Steve Baumann, Glamis Imperial, 1997]. The West Pit Alternative would eliminate (compared to the Proposed Action) the East Pit, the East Waste Rock Stockpile, and the East Pit West and East Pit East drainage diversions from the Project mine and process area. In addition, the size of the leach pad, the process area, and the haul and maintenance roads would also be reduced from those under the Proposed Action within the Project mine and process area. Also, no more than two (2) ground water production wells would be required. All of the other components of the Proposed Action, including the associated areas of disturbance, the lime bin area and fresh water pond, soil stockpiles, office and maintenance and power facilities, Indian Pass Road realignments, water pipeline, and transmission lines, would still be required and would

be constructed and operated as under the Proposed Action. Figure 2.12 provides a general layout of the facilities within the West Pit Alternative project mine and process area.

The estimated surface area disturbed by the West Pit Alternative is presented in Table 2.6. The total area of surface disturbance within the West Pit Alternative project mine and process area would be reduced to 795 acres, or approximately 61 percent of the 1,302 acres disturbed under the Proposed Action. Total surface disturbance under the West Pit Alternative would be reduced to approximately 853 acres, or approximately 63 percent of the total 1,362 acres disturbed under the Proposed Action.

Only a small portion of the West Pit would be backfilled with waste rock, this from mining of the Singer Pit. The Singer Pit would not be backfilled, since the East Pit would not be mined under the West Pit Alternative (see Figure 2.13 for the contours of the features within the West Pit Alternative project mine and process area following the completion of mining but before the implementation of final reclamation). Both the South Waste Rock Stockpile and the heap would be constructed to approximately the same height under the West Pit Alternative as under the Proposed Action.

Mining and processing rates for the West Pit Alternative would be the same as those for the Proposed Action, and initial capital costs, and ongoing capital and operating costs, would also be similar. However, total Project life for the West Pit Alternative would be approximately ten (10) years, reduced from the approximately twenty (20) years under the Proposed Action (Personal Communication, Steve Baumann, Glamis Imperial, 1997). Final reclamation may continue beyond the end of this ten (10) years.

The West Pit Alternative assumes the implementation of all of the environmental protection measures incorporated into the Proposed Action. Also, the West Pit Alternative assumes that following the completion of mining, all of the same reclamation methods which are to be applied for the Proposed Action would be undertaken and completed for the West Pit Alternative. This includes concurrent reclamation of diversion channels; demolition of structures and removal of facilities; rinsing and neutralization of residual leach solution in the solution ponds and heap; the construction of boulder barricades around the open pits for public safety and to exclude vehicle access; design and construction of stable slopes; rough regrading; surface preparation through fine grading, ripping to loosen soil, topsoiling, and/or construction of water catchments for vegetation; tree and cactus transplantation; reseeding and revegetation; or natural revegetation. Even though the West Pit would not be backfilled, Indian Pass Road would be returned to a location east of and approximately parallel to the diverted West Pit West Diversion channel following the completion of mining, since the design of the West Pit West diversion channel provides more than sufficient room to accommodate the road, and the rock rubble barricade and associated pit rim designs would remain between the road and the open pit. The assessment of the probability of the formation of a pit lake after mining would also be conducted on the West Pit after the completion of mining, but since the West Pit would not be as deep as the East Pit was projected to be under the Proposed Action, and under the West Pit Alternative the West Pit would be partially backfilled with waste rock from the Singer Pit, the likelihood of the formation of any pit lake is very remote.

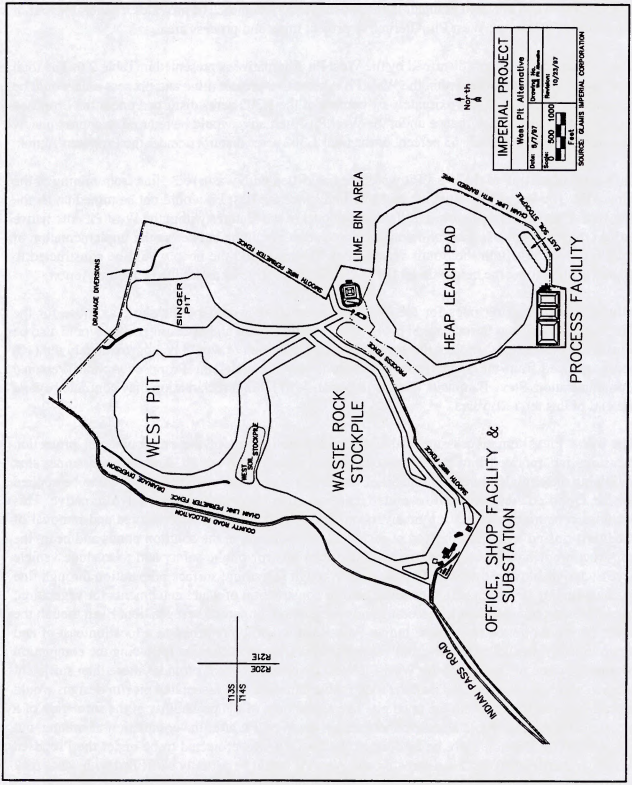

Figure 2.12: West Pit Alternative - Mine and Process Area Facility Details

Table 2.6: Estimated Disturbed and Undisturbed Acres for the West Pit Alternative

COMPONENT			DISTURBED ACRES	RECLAIMED ACRES ON-SITE	RECLAIMED ACRES OFF-SITE	UNDISTURBED ACRES
PROJECT AREA						
Project Mine and Process Area						
Mining Area	1	West Pit	110	0		
	2	East Pit	0	0		
	3	Singer Pit	33	33		
	4	Associated Areas of Disturbance	38	38		
Pad Facilities	5	Leach Pad	200	200		
	6	Process Area	17	17		
	7	Lime Bin Area and Fresh Water Pond	9	9		
Waste Rock Stockpiles	8	East Waste Rock Stockpile	0	0		
	9	South Waste Rock Stockpile	232	232		
Soil Stockpiles	10	West Soil Stockpile	20	20		
	11	East Soil Stockpile	10	10		
Support Facilities	12	Office/Maintenance/Parking/ Power Facilities	21	21		
	13	Haul and Ancillary Roads	71	71		
	14	Drainage Diversions	34	34		
Project Mine and Process Area Subtotal:			**795**	**685**	**0**	**152**
Project Mine and Process Area Total:			**795**	**685**		**152**
TOTAL PROJECT MINE AND PROCESS AREA ACREAGE:			**947**			
Ancillary Area						
Ancillary	15	County Road Realignment	7	7		
	16	Powerline/Water Pipeline	27	27		
	17	Water Wells and Access Roads	2	2		
Project Ancillary Area Subtotal:			**36**	**36**	**0**	**Not Applicable**
Project Ancillary Area Total:			**36**	**36**		**Not Applicable**
TOTAL PROJECT ANCILLARY AREA ACREAGE:			**36**			
PROJECT AREA ACREAGE SUBTOTAL:			**831**	**721**	**0**	**152**
PROJECT AREA ACREAGE TOTAL:			**831**	**721**		**152**
TOTAL PROJECT AREA ACREAGE:			**983**			

OVERBUILT 92 kV/34.5 kV TRANSMISSION LINE CORRIDOR				
Overbuilt 92 kV/34.5 kV Transmission Line	22	22	0	Not Applicable
TOTAL OVERBUILT TRANSMISSION LINE CORRIDOR ACREAGE:	**22**			

PROPOSED ACTION SUMMARY				
Proposed Action Subtotal:	**853**	**743**	**0**	**152**
Proposed Action Total:	**853**	**743**		**152**
TOTAL PROPOSED ACTION ACREAGE:	**1,005**			

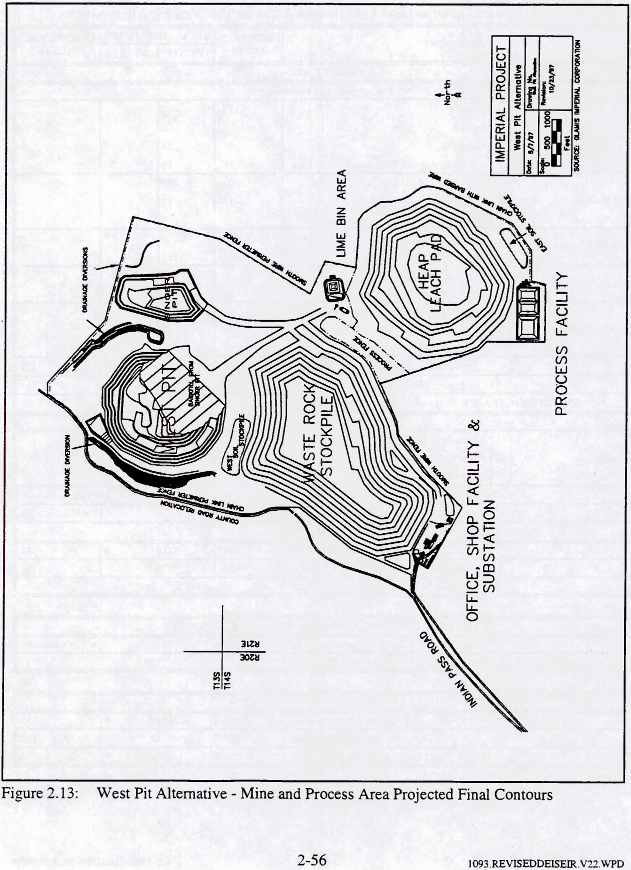

Figure 2.13: West Pit Alternative - Mine and Process Area Projected Final Contours

The West Pit Alternative reduces the amount of ore to be mined to only 40 percent of that which would be mined under the Proposed Action, and thus it would not meet one of the objectives of the project, that of fully developing the identified mineral reserves. In addition, because this alternative would still require nearly all of the equipment (haul trucks, shovel, transmission line, etc.) required for the Proposed Action, the projected capital costs and annual operating costs of the West Pit Alternative are very similar to those of the Proposed Action. Glamis Imperial has stated that this West Pit Alternative would not be an economically viable project, and would thus not meet another project objective, that of profitably mining the precious metals (Personal Communication, Steve Baumann, Glamis Imperial, 1997).

2.2.2. East Pit Alternative

Although it would disturb substantially more surface area that the West Pit Alternative, the reduced project alternative which would reduce the effects of this surface disturbance on cultural resources to a greater degree would be the mining of only the East Pit and the Singer Pit. This East Pit Alternative would produce a total of approximately 300 million tons of mined material (67 percent of that produced under the Proposed Action), of which approximately 90 million tons would be ore and approximately 210 million tons would be waste rock (approximately 60 percent of the ore and 70 percent of the waste rock, respectively, of that produced under the Proposed Action) [Personal Communication, Steve Baumann, Glamis Imperial, 1997]. The East Pit Alternative would eliminate (compared to the Proposed Action) the West Pit, the West Pit West and West Pit East drainage diversions, the West Soil Stockpile, and the relocation of Indian Pass Road within the Project mine and process area. In addition, the size of the leach pad, the South Waste Rock Stockpile, the associated areas of disturbance, and the haul and maintenance roads would be reduced from those under the Proposed Action within the Project mine and process area. Also, no more than three (3) ground water production wells would be required. All of the other components of the Proposed Action, including the lime bin area and fresh water pond, office and maintenance and power facilities, Indian Pass Road realignment at Ogilby Road, water pipeline, and transmission lines, would still be required and would be constructed and operated as under the Proposed Action. Figure 2.14 provides a general layout of the facilities within the East Pit Alternative project mine and process area.

The estimated surface area disturbed by the East Pit Alternative is presented in Table 2.7. The total area of surface disturbance within the East Pit Alternative project mine and process area would be reduced to 1,073 acres, or approximately 82 percent of the 1,302 acres disturbed under the Proposed Action. Total surface disturbance under the East Pit Alternative would be reduced to approximately 1,126 acres, or approximately 83 percent of the total 1,362 acres disturbed under the Proposed Action.

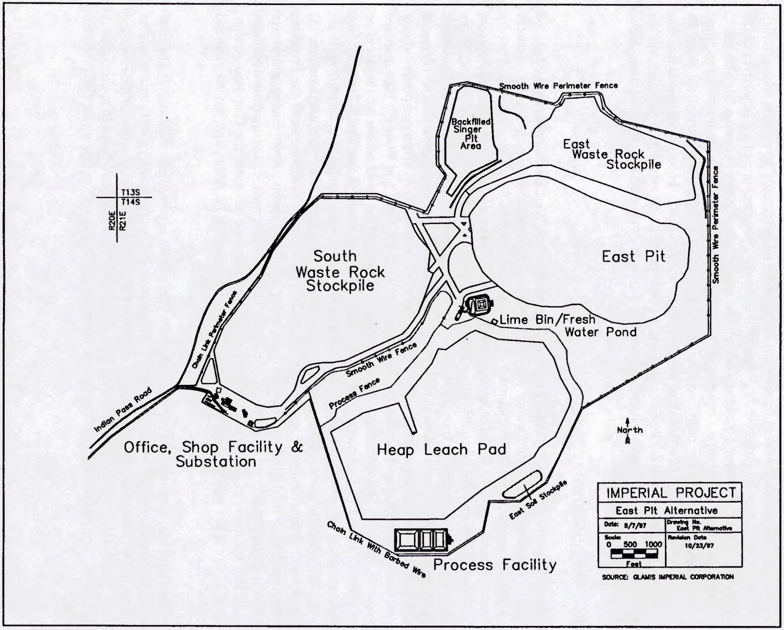

Figure 2.14: East Pit Alternative - Mine and Process Area Facility Details

Table 2.7: Estimated Disturbed and Undisturbed Acres for the East Pit Alternative

COMPONENT			DISTURBED ACRES	RECLAIMED ACRES		UNDISTURBED ACRES
				ON-SITE	OFF-SITE	
PROJECT AREA						
Project Mine and Process Area						
Mining Area	1	West Pit	0	0		
	2	East Pit	198	0		
	3	Singer Pit	33	33		
	4	Associated Areas of Disturbance	13	13		
Pad Facilities	5	Leach Pad	286	286		
	6	Process Area	24	24		
	7	Lime Bin Area and Fresh Water Pond	9	9		
Waste Rock Stockpiles	8	East Waste Rock Stockpile	135	135		
	9	South Waste Rock Stockpile	250	250		
Soil Stockpiles	10	West Soil Stockpile	0	0		
	11	East Soil Stockpile	10	10		
Support Facilities	12	Office/Maintenance/Parking/ Power Facilities	21	21		
	13	Haul and Ancillary Roads	80	80		
	14	Drainage Diversions	14	14		
Project Mine and Process Area Subtotal:			**1,073**	**875**	**0**	**203**
Project Mine and Process Area Total:			**1,073**	**875**		**203**
TOTAL PROJECT MINE AND PROCESS AREA ACREAGE:			**1,276**			
Ancillary Area						
Ancillary	15	County Road Realignment	1	1		
	16	Powerline/Water Pipeline	27	27		
	17	Water Wells and Access Roads	3	3		
Project Ancillary Area Subtotal:			**31**	**31**	**0**	**Not Applicable**
Project Ancillary Area Total:			**31**	**31**		**Not Applicable**
TOTAL PROJECT ANCILLARY AREA ACREAGE:			**31**			
PROJECT AREA ACREAGE SUBTOTAL:			**1,104**	**906**	**0**	**203**
PROJECT AREA ACREAGE TOTAL:			**1,104**	**906**		**203**
TOTAL PROJECT AREA ACREAGE:			**1,307**			
OVERBUILT 92 kV/34.5 kV TRANSMISSION LINE CORRIDOR						
Overbuilt 92 kV/34.5 kV Transmission Line			22	22	0	Not Applicable
TOTAL OVERBUILT TRANSMISSION LINE CORRIDOR ACREAGE:			**22**			
PROPOSED ACTION SUMMARY						
Proposed Action Subtotal:			**1,126**	**928**	**0**	**203**
Proposed Action Total:			**1,126**	**928**		**203**
TOTAL PROPOSED ACTION ACREAGE:			**1,329**			

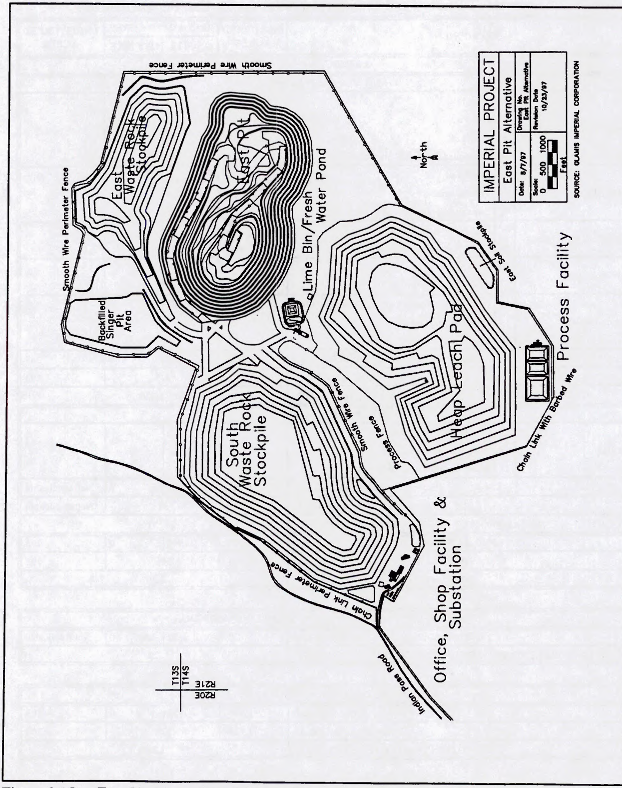

Figure 2.15: East Pit Alternative - Mine and Process Area Projected Final Contours

Under the East Pit Alternative, the Singer Pit would be completely backfilled with waste rock from the mining of the East Pit, and the East Pit would not be backfilled (see Figure 2.15 for the contours of the features within the East Pit Alternative project mine and process area following the completion of mining but before the implementation of final reclamation). The South Waste Rock Stockpile and the East Waste Rock Stockpile would still be constructed to approximately the same height (300 feet) as under the Proposed Action, but the heap would be constructed to only about 250 feet in height.

Mining and processing rates for the East Pit Alternative would be the same as those for the Proposed Action, and initial capital costs, and ongoing capital and operating costs, would also be similar. However, total Project life for the East Pit Alternative would be approximately fourteen (14) years, reduced from the approximately twenty (20) years under the Proposed Action (Personal Communication, Steve Baumann, Glamis Imperial, 1997). Final reclamation may continue beyond the end of this fourteen (14) years. Like the West Pit Alternative, the East Pit Alternative assumes the implementation of all of the environmental protection measures incorporated into the Proposed Action, and assumes that following the completion of mining, all of the same reclamation methods which are to be applied for the Proposed Action would be undertaken and completed for the East Pit Alternative. However, since Indian Pass Road would not be relocated around the project mine and process area under the East Pit Alternative, it would not need to be returned as part of reclamation. Like the Proposed Action, the assessment of the probability of the formation of a pit lake after mining would also be conducted on the East Pit after the completion of mining.

Although the East Pit Alternative would disturb substantially more surface area than the West Pit Alternative, it would reduce the significant, direct and indirect, adverse effects to certain prehistoric cultural features and sites located within the Project mine and process area which were determined to be eligible for the National Register of Historic Places to a greater extent than the West Pit Alternative. This is because the density of these cultural features and sites is much greater in the area of the West Pit than in the area of the East Pit. The East Pit Alternative reduces the amount of ore to be mined to 60 percent of that which would be mined under the Proposed Action, and thus it would also not meet one of the objectives of the project, that of fully developing the identified mineral reserves. In addition, this alternative would also still require nearly all of the equipment required for the Proposed Action, and thus the projected capital costs and annual operating costs of the East Pit Alternative are also very similar to those of the Proposed Action. Glamis Imperial has also stated that this East Pit Alternative would not be an economically viable project, and would thus not meet another project objective, that of profitably mining the precious metals (Personal Communication, Steve Baumann, Glamis Imperial, 1997).

2.2.3. Complete Pit Backfill Alternative

The Complete Pit Backfill Alternative would result in the complete backfilling of all open pits, at least to original grade, as a part of reclamation. It would consist of first implementing the mining, waste stockpiling, and ore processing proposed under the Proposed Action. The East Pit would then

be backfilled with mined waste rock material, which would be loaded from the waste rock stockpiles into haul trucks, driven to the edge of the East Pit, and dumped into the pit until it is full.

Broken rock occupies a greater volume than the same volume of solid rock. Because of this expansion or "swell factor," all the rock mined from an open pit would not fit back into the same pit. The total amount of material mined under the Proposed Action is 450 million tons (300 million tons of waste rock and 150 million tons of ore). The mining of this material would produce three (3) pits with a total volume of approximately 200 million cubic yards. As the material is blasted, it swells before it is loaded and placed on the waste rock stockpiles or leach pad. Based on broken rock densities of approximately 18 cubic feet per ton for waste rock and 20 cubic feet per ton for ore, the Proposed Action would produce approximately 200 million cubic yards of waste rock and 111 million cubic yards of ore. Therefore, the Complete Pit Backfill Alternative would use all of the waste rock available to completely backfill all the mined pits. All of the heaped ore would be left on the leach pad.

The Complete Pit Backfill Alternative would not result in any reduction of the surface disturbance compared to the Proposed Action since the Complete Pit Backfill Alternative begins with implementation of the Proposed Action. However, all of the surface area disturbed by waste rock stockpiles and the East Pit would under the Complete Pit Backfill Alternative be reclaimed at approximately natural grade, since all of the material in the waste rock stockpiles would be moved and dumped into the open East Pit. Figure 2.16 provides a potential layout for such a project, showing the final residual contours prior to reclamation.

Since approximately 100 million tons of waste rock would have already been dumped into the West Pit and Singer Pit under the Proposed Action, the remaining 200 million tons of waste rock would have to be excavated from the waste rock stockpiles and placed into the open East Pit. If the equipment used for mining the Proposed Action is retained and used to backfill the East Pit, and assuming the same typical mining rate of 130,000 tons per day, operating the typical 355 days per year, it would take approximately 4.33 years (4 years, 4 months) beyond the end of mining to move enough waste rock back into the East Pit to fill the East Pit to grade. Based upon the estimated schedule presented in Table 2.5, backfilling the East Pit should be able to be accomplished concurrent with final leaching and neutralization of the heap and final reclamation, such that the life of the Complete Pit Backfill Alternative would not be longer than the Proposed Action. Using a range of \$0.40 to \$0.50 as the cost for loading, hauling approximately one (1) mile to the East Pit, and dumping this stockpiled waste rock (Smith 1997), then the cost of backfilling this waste rock into the East Pit would be approximately \$80 to \$100 million.

The Complete Pit Backfill Alternative would reduce the significant adverse effects on visual resources through the elimination of the waste rock stockpiles and the open pit, although the heap would remain. The Complete Pit Backfill Alternative would also reduce the significant, adverse effects to the Indian Pass-Running Man Traditional Cultural Property, also through the reduction of visual impacts. The Complete Pit Backfill Alternative allows the full amount of discovered ore to

be mined, which conforms to the project objective to fully exercise the rights available under the 1872 Mining Act. However, because of the substantial operating costs required beyond those of the Proposed Action to backfill the East Pit, Glamis Imperial has stated that this Complete Pit Backfill Alternative would not be an economically viable project, and would thus would not meet the objective of profitably mining the precious metals (Personal Communication, Steve Baumann, Glamis Imperial, 1997).

2.2.4. No Action Alternative

The No Action (no project) Alternative forms the baseline from which the impacts of all other alternatives can be measured. Such action would likely not be consistent with the 1872 Mining Act and BLM implementing regulations. It would also generally not be consistent with the BLM multiple use mission and policy of making public lands available for a variety of uses, as long as these uses are conducted in an environmentally sound manner, since the subject lands were not withdrawn for any special use and were open, unappropriated lands when unpatented mining claims were staked. If the No Action Alternative is implemented, the area of the Proposed Action would remain as is, and present uses in the area, including off-highway vehicle use, camping, hunting, and rockhounding, could continue. The area would remain available for future commercial gold processing proposals or for other proposals as permitted by BLM policy or land use designations.

2.2.5. BLM Preferred Alternative

Chapter V, Section B.2.b. of the BLM NEPA Handbook directs that "The manager responsible for preparing the EIS should select the BLM's preferred alternative. ... For externally initiated proposals, ... the BLM selects its preferred alternative unless another law prohibits such an expression. ... The selection of the preferred alternative should be based on the environmental analysis as well as consideration of other factors which influence the decision or are required under another statutory authority."

Thus, the BLM Preferred Alternative is the alternative that best fulfills the agency's statutory mission and responsibilities (see Section 1.6.1), giving consideration to economic, environmental, technical and other factors. BLM has determined that, with the addition of the applicable mitigation measures listed in Chapter 4, the Proposed Action is the BLM's Preferred Alternative.

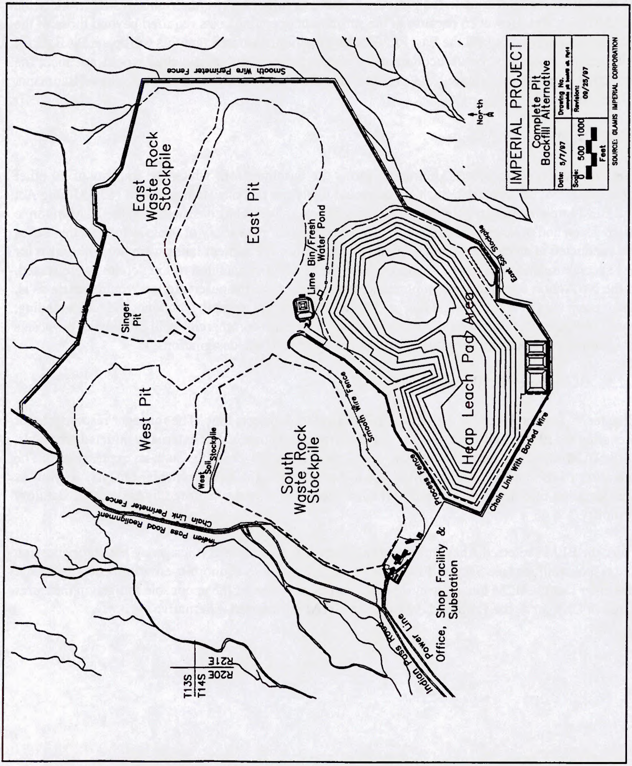

Figure 2.16: Complete Pit Backfill Alternative - Mine and Process Area Projected Final Contours

2.3. Alternatives Eliminated from Detailed Consideration

A number of potential alternatives to the Proposed Action were suggested during scoping, either by the lead agencies or as requests by the public. Consistent with the direction discussed in Section 2.2, alternatives to be considered in this EIS/EIR are limited to those that would avoid or substantially lessen any of the significant effects of the project and could feasibly attain most of the basic objectives of the project. Accordingly, all of the developed potential alternatives (except those which are described in Section 2.2) are discussed and evaluated below; first for their ability to avoid or substantially lessen any one (1) or more of the significant environmental effects of the Proposed Action, and then to determine whether they could feasibly attain most of the basic objectives of the project. The rationale for considering but not selecting for further analysis these suggested alternatives is also provided.

This assessment of suggested alternatives eliminated from detailed consideration is separated into two (2) principal categories: those which proposed alternative locations for Project components; and those which propose alternative methods for extracting and processing the precious minerals.

2.3.1. Facility Location Alternatives

2.3.1.1. Alternative Mine Locations

One suggested alternative was to construct and operate a mine at an entirely different location than the Project Area. Such an alternative would clearly eliminate all of the residual significant adverse effects of the Proposed Action, although the significant adverse environmental effects of any such alternative project may be greater or lesser than those of the Proposed Action. In the absence of an actual location to consider, any attempt to evaluate the environmental impacts of this suggested alternative would be speculative and not add substantially to the environmental analysis presented in this EIS/EIR. However, such an alternative would also clearly fail to meet any of the basic objectives of the Proposed Action (to profitably recover as much of the precious metals within the Project mine and process area as possible, in conformance with the 1872 Mining Act), and is therefore eliminated from detailed consideration.

2.3.1.2. Alternative Mine Facility Locations Within the Project Mine and Process Area

This section looks at potential alternative locations for or layouts of the major mine facilities (pits, heap leach pad, and waste rock stockpiles), which are the facilities which create the principal significant effects of the Proposed Action.

The location of each of the three (3) pits (West Pit, Singer Pit and East Pit) is strictly dictated by the location of the identified ore; there are no locational alternatives for any of the pits. The design for each of the pits was dictated principally by the distribution of identified ore, as constrained by the structural stability of the rock which would form the pit walls and by the ability to economically

mine, haul and process the ore. Alternative pit designs (such as using lesser angle slopes) could be developed, although none (short of eliminating the pit entirely) would avoid or substantially lessen any of the significant environmental effects of the Proposed Action, and any alternative pit design would reduce conformance with the basic objectives of the Project (to profitably recover as much of the precious metals within the Project mine and process area as possible, in conformance with the 1872 Mining Act).

The proposed locations of the Project heap leach pad and waste rock stockpiles were selected by Glamis Imperial after consideration of several operational, cost and environmental factors: minimization of the truck haul distance and gradient from the open pits to the waste rock stockpiles and heap leach pad; efficiencies in the construction and operation of the heap leach facility, including a desire for gravity flow from the leach pad to the processing facility; adequate ore (heap) and waste rock storage capacity; avoidance of sensitive environmental resources; consolidation of mine facilities; and absence of economic mineral reserves or potential economic reserves below the heap leach pad and waste rock stockpiles.

Relocation of either the heap leach pad or the waste rock stockpiles from their locations under the Proposed Action to other locations within the Project mine and process area would not avoid or substantially lessen any of the significant environmental effects of the Proposed Action. Although the specific layout of both the heap and the waste rock stockpiles have been altered by Glamis Imperial since November 1996 to avoid direct disturbance to some of the identified cultural resources, there is insufficient area within the Project mine and process area which is not already occupied by other project facilities to allow the movement of the entire heap or either or both of the waste rock stockpiles to avoid significant, adverse effects to these cultural resource sites. In addition, the height of the heap and both of the waste rock stockpiles would remain unchanged from the Proposed Action, and thus would still conflict with the designated Indian Pass-Running Man ATCC and result in a significant, unmitigatable, adverse effect on visual resources. Thus, any alternative which considered movement of any or all of these facilities within the Project mine and process facility was judged infeasible and eliminated from detailed consideration.

2.3.1.3. Alternative Mine Facility Locations Outside the Project Mine and Process Area

Relocation of the heap leach pad and/or one (1) or both of the waste rock stockpiles from their locations proposed under the Proposed Action to other locations outside of the Project mine and process area, depending on the new locations, could avoid or substantially lessen the significant environmental effects of the Proposed Action to identified cultural resources eligible for the National Register of Historic Places (NRHP); the designated Indian Pass-Running Man ATCC; and the significant, unmitigatable, adverse impact on visual resources. Based on the results of the inventory for cultural resources (see Section 3.6.2.3; see also Appendix L), significant cultural features are either known or inferred to the north and northwest for at least two (2) miles (to at least Indian Pass); to the west for approximately one (1) mile; to the southwest for at least three (3) miles; and to the south for at least one-half (½) mile, of the Project mine and process area. Thus, Project facilities (the

heap leach pad and/or the waste rock stockpiles) would have to be relocated outside of these areas to substantially reduce the significant effects to cultural resource sites. All of these same areas, plus an area up to one (1) mile to the east and one (1) additional mile to the south of the Project mine and process area, are included within the Indian Pass-Running Man ATCC, and these same project facilities would need to be relocated outside of the Indian Pass-Running Man ATCC to be considered to substantially reduce the significant effects to the Indian Pass-Running Man ATCC.

The potential locational alternative which is most likely to be "feasible" is the one which adds the least additional cost to the Proposed Action, since additional costs reduce the economic "feasibility" of the Proposed Action. Based on the distances discussed above which are necessary to substantially lessen any of the significant effects of the Proposed Action, the most potentially "feasible" alternative would be one which moved the heap to the southeast of its proposed location approximately one (1) mile, and the South Waste Rock Stockpile to the east of its proposed location approximately two (2) miles. These locations would place both facilities on the other side of the large ephemeral stream channel which forms the eastern boundary of the Project mine and process area. The North Waste Rock Stockpile would remain in its proposed location, as constructing this feature in this location has a relatively low likelihood of creating substantial significant adverse effects (because of its relatively low height and the relative lack of cultural resources in the area), and the West Pit and Singer Pit would still be backfilled with waste rock during the mining of the East Pit.

Moving the South Waste Rock Stockpile and the heap to these new locations would substantially reduce the significant environmental effects of the Project to the identified cultural resource sites, although it would not eliminate or substantially lessen the significant effects of the pits to identified cultural resource sites. Thus, this alternative would still have a significant adverse effect on cultural resources. This alternative would also not substantially reduce the effects of the Project on either the Indian Pass-Running Man ATCC (which would require moving these features at least one (1) additional mile), or the significant, unmitigatable, adverse impacts on visual resources.

Moving the heap to this new location would add at least one (1) mile to the distance required to haul the ore to the heap location proposed in the Proposed Action, and moving the South Waste Rock Stockpile to this new location would add at least two (2) miles to the distance required to haul the waste rock from the West Pit to the new waste rock stockpile location. Assuming that all of the ore (150 million tons), and approximately two-thirds (⅔) of the waste rock not backfilled into the West Pit and Singer Pit (133 million tons), would be hauled to the heap and new waste rock stockpile, respectively, and assuming a range of costs of from $0.07 to $0.12 per ton per incremental mile of haul (Smith 1997), then the estimated cost of hauling these mined materials to the new facility locations would alone range from $29 to $50 million. In addition, there would be extra costs for constructing and maintaining the extra miles of road and ephemeral stream crossing(s), additional perimeter fence, etc. Even the additional cost of $29 to $50 million alone would make this project alternative infeasible, since the project would no longer be economic (Smith 1997).

Any other alternative which proposed moving any or all of these project facilities (the heap or waste rock stockpiles) further away from the pits (such as to the Picacho Mine, Mesquite Mine or American Girl Mine) would also be infeasible for economic reasons, since even greater costs would be incurred by hauling mined material further. Any proposal which combined the new locations with elimination of the West Pit (or the East Pit) to reduce the significant adverse effects to cultural resources from that pit and reduce the cost of moving that ore and waste rock to the new heap and waste rock stockpile locations, respectively, would also be infeasible for economic reasons, as eliminating the West Pit substantially reduces the income to the project, and also eliminates the West Pit as a location for disposal of waste rock, increasing the quantity of waste rock which must be hauled the additional distance to the new waste rock stockpile location.

In addition to the economic costs of any of these potential alternatives, there would also be additional environmental effects, although none would likely be increased to the level of significance: hauling these mined materials these additional distances would increase the amount of fugitive dust created; increase the amount of water used to water the additional roads to control this dust; increase the amount of surface area (and microphyll woodland habitat) disturbed, increase the potential for adverse effects to wildlife from the additional miles driven on the haul roads and the access roads, isolation of habitat, and impediments to wildlife movement; and increase the noise (more trucks driving longer distances) and visual effects (features spread out over more area and more "sky glow") from the project.

2.3.1.4. Alternatives to the Relocation of Indian Pass Road

Alternatives were suggested to avoid the relocation of Indian Pass Road to the west. One alternative suggested moving Indian Pass Road to a location east of and approximately parallel to the diverted West Pit West Diversion channel from the beginning, as proposed under the West Pit Alternative, since the design of the West Pit West diversion channel provides more than sufficient room to accommodate the road. This alternative is not feasible since in this location Indian Pass Road would be too close to the West Pit to be safe during blasting. The road could only be moved to this location after the end of mining of the West Pit.

Another alternative suggested reducing the size of the West Pit to eliminate the need to relocate Indian Pass Road. This suggested alternative would also eliminate the need to divert the West Pit West ephemeral stream channel, thus reducing the total area to be disturbed and the amount of microphyll woodland habitat which would be disturbed. In order to avoid physically relocating Indian Pass Road, the West Pit would need to be reduced in a roughly east-west direction by about one-third (⅓) (see Figure 2.2), which would result in a reduction in the volume of the West Pit by almost one-half (½) (see Figure 2.3). Because a substantial portion of the ore to be mined in the West Pit is at depth (see Figure 3.2), this would reduce the ore which could be mined from the West Pit by at least one-half (½). Although there would be an approximate 15 percent reduction in the total volume of material which would be mined and added to the heap and waste rock stockpiles, the volume (and area) of the West Pit available for the placement of waste rock would also be reduced.

Thus, the height of one (1) or both of the waste rock stockpiles would have to be increased. Capital costs to construct the Project would only be slightly reduced. Indian Pass Road would also likely need to be closed to traffic during any blasting in the West Pit to ensure safety. Because this suggested alternative did not substantially decrease the significant adverse effects of the Proposed Action, and reduced conformance with the basic objectives of the Proposed Action, it was not considered further. The East Pit Alternative would also be a more logical alternative than one which only reduced the size of the West Pit.

Another suggested alternative was to reroute Indian Pass Road to the south, east and north of the Project mine and process area to avoid disturbing the hills to the northwest of the Project mine and process area. Any alternative routing to the south, east and north of the Project mine and process area would be required to be outside of the Project mine and process area during the period the Project was active. This would greatly increase the total length of, and amount of disturbance from, new road construction, and would require two (2) crossings each of at least two (2) major ephemeral stream channels. This routing would also likely increase the impacts of the road relocation on cultural resources. Because this suggested alternative did not decrease the significant adverse effects of the Proposed Action, it was not considered further.

2.3.1.5. Alternative Water Sources

The Proposed Action includes the development of a well field approximately four (4) miles southwest of the Project mine and process area to provide the water required for the Project. Up to four (4) water wells are planned along a 1.5 mile section of Indian Pass Road within the Project ancillary area (see Figure 2.1). These wells would be connected to the Project mine and process area by pipeline. One test well has already been drilled (PW-1), and the site for the second well (PW-2), necessary to meet the Project water demands, has been located. If the other two (2) water wells are necessary to meet Project water requirements, they would be located along the designated section of Indian Pass Road.

The selected ground water well field area is located adjacent to Indian Pass Road. Potential alternatives farther away from Indian Pass Road would likely create the need for additional access roads, and thus additional adverse environmental effects, in the area. Alternative locations closer to the Project mine and process area would move the water well field into the Indian Pass-Running Man ATCC, thus adding to the significant adverse effects of the Project. Alternative locations for the ground water well field closer to the Project mine and process area would also have substantially less potential for successfully producing the ground water necessary for the Project, and are judged to be not technically feasible. Alternative locations farther from the Project mine and process area would not eliminate or substantially reduce the significant environmental effects of the Proposed Action, and would slightly increase the adverse environmental effects and costs of the water production and delivery process.

Even if the Project were able to collect and store for utilization all of the rain falling on the disturbed areas within the Project mine and process area, which is not possible, this would produce less than 400 acre feet in an average year, which is far less than is necessary for the Project.

The only other possible sources of water would be the use of existing surface water resources from either the Colorado River or the All American Canal. Transportation of the required quantity of water from either of these sources to the Project mine and process area could not be accomplished by any means other than pipeline, which would require construction through environmentally sensitive areas and substantial energy expenditures for pumping the water. Elimination of the ground water well field would not eliminate nor substantially reduce the significant adverse environmental effects of the Proposed Action since the ground water well field does not contribute to these effects. In addition, production of water from surface sources is judged to be not feasible since there appear to be no rights to these waters which can be legally or economically obtained by Glamis Imperial. The 115 afy Colorado River water right currently used by Glamis Imperial's sister company, Chemgold, for its existing Picacho Mine Project (see Section 5.2.1.3) cannot be transferred (Personal Communication, C. Kevin McArthur, Chemgold, 1995), and this water right is only approximately 10 percent of the water needed by the Project. Thus, this suggested alternative was eliminated from further consideration.

2.3.1.6. Utility Power Supply Alternatives

Peak Project electrical power requirements of approximately 8 MW would be supplied from the utility system, which would include the overbuilding of an existing 34.5 kV transmission line for approximately 16 miles to create an "overbuilt" 92 kV/34.5 kV transmission line. A new 92 kV transmission line would be built to the Project mine and process area adjacent to Indian Pass Road, and a 13.2 kV distribution line for providing power to the ground water wells would be "underbuilt" on the new 92 kV transmission line poles. Alternative utility sources of this power were considered, but each was eliminated from further consideration for the reasons provided below.

Use of the existing IID 34.5 kV transmission line without upgrade to 92 kV was determined to be not feasible by the IID, as the 34.5 kV transmission line was not capable of transmitting the 8 MW of power required by the Project (Personal Communication, Charles Williams, IID, 1995). This suggested alternative would also not eliminate or substantially reduce any of the significant environmental effects of the Proposed Action.

Use of an existing Western Area Power Authority (WAPA) 161 kV transmission line, which runs parallel and adjacent to the IID 34.5 kV transmission line, was also considered as a means to provide power to the Project mine and process area. Two (2) alternative points of interconnection to the WAPA transmission line were considered. One would require the construction of a small 161 kV/34.5 kV substation to take power off of the WAPA line at the point where the WAPA line crosses Indian Pass Road (see Section 2.1.9.3). A 34.5 kV transmission line would then be built parallel to Indian Pass Road to bring power to the Project mine and process area. This alternative

would not eliminate or substantially reduce any of the significant environmental effects of the Proposed Action, since it would follow the same route as the overbuilt 92 kV/13.2 kV transmission line through the Indian Pass-Running Man ATCC. A second alternative would bring power off of the WAPA 161 kV transmission line at the existing Gold Mine Tap substation, located approximately eight (8) miles northwest of the Project mine and process area. A new 92 kV transmission line would be constructed south-southeast, parallel to the existing 161 kV transmission line, for approximately four (4) miles. There, the line would be "overbuilt" on the existing 34.5 kV IID transmission line. Finally, the line would turn east and run approximately five (5) miles over new ground to the Project mine and process area. This alternative would likely slightly increase the adverse environmental effects of the Proposed Action on the Indian Pass-Running Man ATCC, since a portion of the transmission line would be constructed within the Indian Pass-Running Man ATCC, and the 13.2 kV distribution line would still have to be constructed from the Project mine and process area to provide power to each of the ground water wells. In addition, a substantial portion of the new transmission line would be built within designated critical habitat of the desert tortoise, which may create a new significant adverse effect. Both of these potential alternatives were determined to be not feasible, however, since WAPA would not provide the Project with "firm," or non-discretionary, capacity to transmit the power, thus eliminating any WAPA 161 kV transmission alternative from further consideration (Personal Communication, C. Kevin McArthur, Glamis Imperial, 1995).

2.3.1.7. Electrical Power Generation Alternative

Peak Project electrical power requirements could be reduced to less than approximately 2.8 MW if the Project used diesel-powered shovels or loaders instead of electric shovels. To provide the electrical power to all of the remaining electrical-powered facilities located within the Project mine and process area, the Project would install diesel-powered electrical generators at the Shop and Office Facility area instead of overbuilding the 34.5 kV transmission line to connect to the utility system. Two (2), 2,000± kW, pre-packaged, diesel generator sets would likely be installed, with one (1) of the installed diesel generator sets being reserved principally as a backup to the operating set. Additionally, two (2), 800± kW, pre-packaged, diesel generator sets would be installed adjacent to one (1) of the ground water production well locations to provide electrical power to all of the well pump(s). One (1) of the installed diesel generator sets would also be reserved principally as a backup to the operating set. A 13.2 kV distribution line would be built adjacent to the ground water well access road(s) to supply electrical power from the generator(s) to the other ground water well pumps. Annual diesel fuel consumption would rise from approximately 4 million gallons to approximately 5 million gallons.

This possible alternative would likely slightly decrease the significant adverse environmental effects of the Proposed Action on the Indian Pass-Running Man ATCC, since no transmission line or distribution line would be built within the Indian Pass-Running Man ATCC. However, this alternative would consume more diesel fuel, creating more air pollution both within the Project mine and process area and in the Project ancillary area, and increase the ambient noise levels in the Project

ancillary area. This possible alternative would not substantially reduce the significant adverse effects of the Proposed Action, since there would be no alteration of the pits, heap or waste rock stockpiles. Thus, this alternative was eliminated from further consideration.

The CDCA Plan Multiple-Use Class L (Limited) Guidelines for Transmission Facilities state that "New distribution systems may be allowed and will be placed underground where feasible except where this would have a more detrimental effect on the environment than surface alignment. In addition, new distribution facilities shall be placed within existing rights-of-way where they are reasonably available." (BLM 1980) A 92 kV electric transmission line is a low voltage transmission line, not a distribution line, and thus is not directly subject to this requirement of the CDCA Plan.

Although technology to place the 92 kV transmission line under ground is available, its use in rural settings is very limited (BLM, et al. 1997), and the IID has neither the technical nor staff capabilities to either construct or maintain an underground transmission line (Personal Communication, Dwayne McElroy, IID, October 13, 1997). Of the three (3) principal cable systems used for underground transmission lines (high pressure fluid filled, self contained fluid filled, and solid dielectric), solid dielectric is the least expensive technology which has been proven reliable at lower transmission line voltages (69 kV to 138 kV)[CPUC and BLM 1995]. To underground the new 92 kV transmission line would require first the construction of a conversion facility (estimated to require a fenced, graveled area of approximately 100 feet by 100 feet) at the point of connection with the overbuilt 92 kV/34.5 kV overhead transmission line. Next, a continuous trench approximately six (6) to ten (10) feet wide and six (6) feet deep would have to be excavated the entire 3.7 mile length of the transmission line to the Project mine and process area. The cable would be placed in ducts at a depth of approximately four (4) feet bgs to allow removal (if necessary), with as much as two (2) feet of controlled thermal backfill (typically lean concrete with special aggregate) below, to either side, and above the cable (BLM, et al. 1997). At the point(s) where the underground transmission line would cross an ephemeral stream channel, the trench and the transmission line would have to be made substantially deeper to avoid washouts. Vaults for splicing and cable pulling would likely be required every 1,000 to 1,500 feet. Any failure or fault in the line would require excavation in order to repair or replace the failed section of line.

Placing the new 92 kV/13.2 kV transmission line underground would slightly decrease the significant adverse environmental effects of the Proposed Action on the Indian Pass-Running Man ATCC by eliminating the visual effects of the above ground transmission line on the Indian Pass-Running Man ATCC, but may slightly increase the significant effects to cultural sites and the Indian Pass-Running Man ATCC through the trenching necessary before and after implementation of the Proposed Action. This alternative would not substantially reduce the significant adverse effects of the Proposed Action on visual resources, since there would be no alteration of the pits, heap or waste rock stockpiles, and would create additional surface disturbance as a result of the construction of the trench and any excavation of trench to repair faults or failed sections of the line. Costs for constructing a buried transmission line are from eight (8) to ten (10) times the construction costs for standard above ground transmission lines, and maintenance costs and line (electric) losses

are also substantially higher (BLM, et al. 1997). Since this suggested alternative did not substantially decrease any of the significant adverse effects of the Proposed Action, and because of its cost would reduce conformance with the basic project objectives, it was eliminated from any further consideration.

2.3.2. Alternative Mining and Processing Methods

Suggested alternative mining and processing methods, if feasible, may be able to eliminate or substantially reduce the residual significant adverse effects of the Proposed Action by eliminating or reducing the size of the pit(s) and waste rock stockpiles, or eliminating the heap.

2.3.2.1. Alternative Mining Techniques

Although there are several variations on the technique, underground mining basically consists of sinking a shaft or driving an adit from the surface underground to the ore, then extracting the ore back to the surface for processing. Underground mining would eliminate the open pits and would produce substantially less waste rock. This has the potential to substantially reduce the residual significant adverse effects of the Project: to the identified cultural resource sites, by eliminating most of the surface disturbance; to visual resources, by substantially reducing the height of the waste rock stockpiles; and from the cumulative adverse impact to air quality from the emission of particulate matter, which is principally associated with surface mining and handling activities. There would still be residual significant adverse effects to the Indian Pass-Running Man ATCC.

Underground mining methods best develop structure-dependent, high-grade ore deposits such as quartz veins, shear veins, and shear swarms, which are not the predominant structures in the Project ore bodies. Development of underground deposits requires complex technical capabilities and engineering design, which are expensive and extremely labor intensive (compared to open pit mining). Minimum ore grades (measured in ounces of gold per ton of ore) and quantities of ore are necessary to make this method economically feasible. Smith (1997) surveyed mining industry practices for the minimum ore grades and quantities required to make various alternative underground mining techniques and processing techniques economically feasible. Smith also reviewed Glamis Imperial's confidential data regarding the Imperial Project ore deposit and Project economics. He concluded that at a gold price of $400.00 per ounce, there are no blocks of gold ore within the Project deposits which would meet either the minimum grade or tonnage necessary to make underground mining economically feasible. At gold prices lower than $400.00 per once, the minimum ore grade required to reach economic feasibility would have to be increased accordingly. Thus, all potential underground mining alternatives were eliminated from further consideration as being economically infeasible.

In-situ leaching of precious metals from ore consists of injecting the leaching solution directly into an ore body while it is still in place in the ground and recovering the gold-bearing solution by pumping from extraction wells. This potential alternative would eliminate the mining of ore and

waste rock, and thus eliminate all of the residual significant adverse effects of the Proposed Action. However, if the gold-bearing deposits are not confined between formations which would completely contain the leaching solutions, the potential for loss of gold-bearing leach solution and significant adverse environmental effects to ground water are very high. Since the Project area contains many linear geologic structures such as faults and shears which could serve as conduits for solutions injected to leach the ore deposits to travel beyond the control of the operator, the significant risk of ground water contamination make the use of this method technically infeasible for the Project ore deposits. Additionally, Smith (1997) found no examples of the use of this technique for precious metal deposits. Thus, it was eliminated from further consideration.

2.3.2.2. Alternative Processing Techniques

Like underground mining, there are several potential alternative methods for processing ore. The vat leaching process is somewhat similar to heap leaching, except that the ore is first crushed to a fine particle size, then leached in large, shallow tanks. Vat leaching is an appropriate technique to employ with ores with rapid gold dissolution rates, typically those with extraction rates of no more than three (3) days. Vat leaching is more capital intensive than heap leaching, and requires more surface processing facilities, including the leach tanks, than the heap leach process facilities. Vat leaching produces a similar volume of leached material than heap leaching. Because the vat leaching process creates wet (saturated) tailings rather than the (relatively) dry heaped material, vat leaching consumes substantially more water than heap leaching for the same quantity of material processed. It also requires the construction of a tailings impoundment to dispose of this wet waste material. Since the tailings are saturated with water and would not be able to be stacked like the heap, the height of the tailings impoundment would be much lower. This would require the disturbance of a much greater surface area than that of the Proposed Action.

The vat leaching alternative would likely reduce the significant adverse effects of the Proposed Action on visual resources resulting from the heap because of its lower height, but would not substantially reduce this significant adverse effect for the Project as a whole since the waste rock stockpiles would still be built. In addition, there would be substantial additional environmental effects from the large amount of additional surface disturbance which would be needed to create the tailings impoundment. Metallurgical testing of Project ores indicates the necessity of leaching periods in excess of 90 days to reach ultimate gold extraction levels. Smith (1997) also concluded that at a gold price of $400.00 per ounce, there are no blocks of gold ore within the Project deposits which would meet either the minimum grade or tonnage to make vat leaching economically feasible. Thus, vat leaching was determined to be economically infeasible and eliminated from further consideration as an alternative to heap leach processing.

The carbon-in-pulp (CIP) method of gold extraction requires the grinding of crushed ore material to fine particle sizes that both liberates the gold and exposes the maximum mineral surface area. It is similar to vat leaching in its consumption of water, need for wet tailings impoundments, capital requirements for crushing and grinding facilities, energy costs, consumption of land area, and

generally low impoundment height. Thus, this potential alternative would generally have both the same environmental advantages and disadvantages as vat leaching. Smith (1997) also concluded that at a gold price of $400.00 per ounce, there are no blocks of gold ore within the Project deposits which would meet either the minimum grade or tonnage required to make CIP economically feasible. Thus, CIP was determined economically infeasible and eliminated from further consideration as an alternative to heap leach processing.

The flotation method of gold extraction is used for ores containing appreciable quantities of sulfide minerals. The environmental advantages and disadvantages are very similar to vat leaching and CIP. Physical observations, microscopic analysis, and independent metallurgical tests conducted to date for Glamis Imperial have confirmed that the Project ore is essentially sulfide-free (Personal Communication, Dan Purvance, Glamis Imperial, 1995). Consequently, flotation is not technically feasible for the Project ore, and was eliminated from further consideration.

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3. AFFECTED ENVIRONMENT

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3.1. Geology and Mineral Resources

3.1.1. Geological Setting

The Project mine and process area is located in southeast California within the Colorado Desert portion of the Basin and Range physiographic province along the southwestern flank of the Chocolate Mountains (Norris and Webb 1976). The southeastern portion of the Chocolate Mountains consists largely of Jurassic age (180 to 135 million years ago) gneisses and schists overlain by Tertiary age (65 to 1 million years ago) basalts, fanglomerates, and Quaternary age (1 million years ago to present) alluvium (see Figure 3.1). A thin veneer of flood basalt caps the gravel and forms distinct ridges and land forms (Clark 1970).

About 95 percent of the Project mine and process area consists of Quaternary age alluvium (in the active ephemeral stream channels) and older alluvium (in the upland areas), which vary in thickness from 10 to 1,000 feet. Below the Quaternary age sediments, the geologic section in the Project mine and process area consists of the Jurassic schist and gneiss units unconformably overlain by Tertiary andesite and basalts (see Figure 3.2). The lowermost unit that would be exposed during mining activities is an undifferentiated Jurassic gneiss which forms the footwall to the orebody (Personal Communication, Dan Purvance, Chemgold, 1996). Generally above the undifferentiated gneiss is a biotite gneiss which has sericitic schist zones that appear to be structurally and/or hydrothermally localized. The biotite gneiss varies from a white quartzo-feldspathic rock to a dark gray hornblende-biotite gneiss. Often the biotite gneiss has a shatter-breccia texture that is variably cemented by iron oxides, clays and less commonly quartz or carbonate. The sericitic schist is a white, red-to-tan iron-oxide-stained rock composed predominantly of sericite with quartz. The sericite schist is weak and highly foliated.

A discontinuous horizon of Tertiary basalt flows and volcanicistic mudflows (and/or paleosoil horizons) with basaltic fragments rest unconformably on the Jurassic rocks (Personal Communication, Dan Purvance, Chemgold, 1996). This volcanic unit is discontinuous and thin, ranging from zero (0) to 100 feet in thickness within the Project mine and process area. A Tertiary age conglomerate overlies the volcanics, or lies directly on the Jurassic metamorphics where the volcanics are absent. The conglomerate is typically a moderately well indurated, clay/carbonate/iron oxide-cemented material with coarse, subangular gneissic fragments in a moderate- to coarse-grained sand matrix with considerable mica component. Zones of finer-grained material, including silty sands and silts, are present locally.

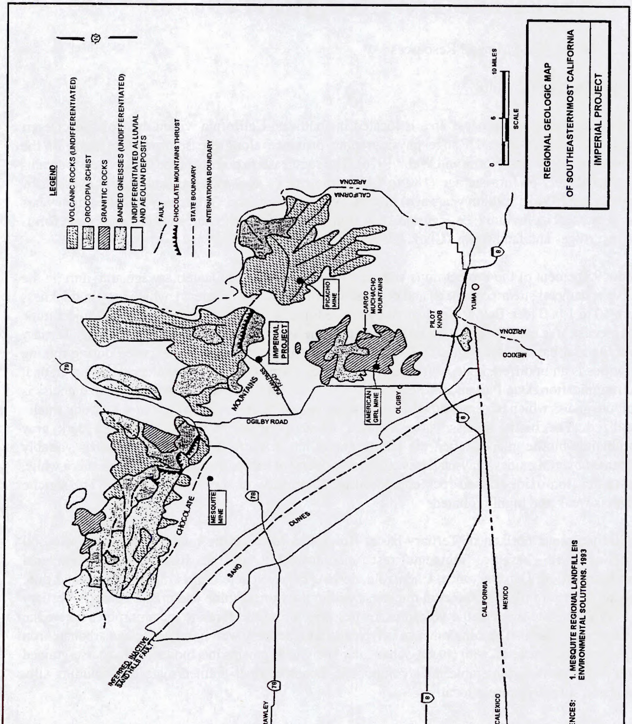

Figure 3.1: Generalized Regional Geologic Map

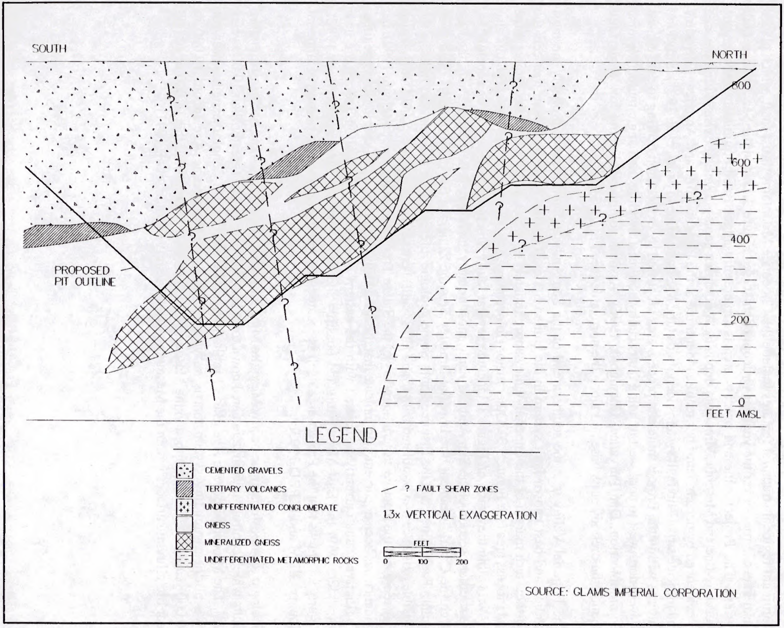

Figure 3.2: Simplified Geologic Cross Section through the West Pit

Dominant regional structural features include the Chocolate Mountains thrust fault, which placed basal gneissic rocks over the younger Orocopia Schist (see Figure 3.1), and the San Andreas fault system. The Project mine and process area is structurally aligned and equidistant between the Picacho Mine and Mesquite Mine gold deposits. A complex geologic setting exists within the area as evidenced by detachment fault features identified at the Picacho Mine and American Girl Mine and intricate strike-slip fault systems identified at the Mesquite Mine (Tosdal, et al. 1991). Structural patterns within the Project mine and process area identified by exploration drilling to date consist of west-northwest to northwest trending faults cut by northeast trending high angle faults (Personal Communication, Dan Purvance, Chemgold, 1996). A south-southwest dipping low angle fault bounds the orebody at its base and along the north side (see Figure 3.2).

The Imperial Valley is at the southern end of the San Andreas Fault system, probably the most studied and best known fault system in the United States. The San Andreas system transects the northeastern margin of the Imperial Valley approximately 63 miles northwest of the Project mine and process area (see Figure 3.3). Other major Holocene age (10,000 years ago to present) faults also shown within the region on Figure 3.3 include several faults which parallel, or are "en echelon" to, the southern section of the San Andreas Fault, most notably the reported East Mesa Fault, the East Highline Canal lineament, the Imperial-Brawley Seismic Zone, the Superstition Hills Fault (San Jacinto Fault Zone), and the Elsinore Fault. Some geologic references for the area also indicate the possible existence of a postulated fault (Sand Hills Fault) beneath the Algodones Sand Dunes, which may represent the inactive eastern boundary of the Salton Trough spreading center (Heath 1992). No evidence has been documented to indicate that the Sand Hills Fault has been active in Holocene time. The active faults currently associated with the eastern boundary of the Salton Trough are now coincident with the East Mesa Fault and possibly the East Highline Lineament (Heath 1992). Figure 3.4 shows that the Project area itself is located in a relatively aseismic portion of Imperial County (BLM and ICPBD 1993b).

Geologic relationships in the nearby Mesquite Mine indicate that northwest- and northeast-trending faults which control mineralization are known to be pre-Holocene in age (greater than 10,000 years old). The Miocene-Pliocene Age (3 to 11 million year old) Bear Canyon Conglomerate has been cut by a northeast-trending system that is no younger than late Pleistocene Age (about 10,000 to 60,000 years old). Faults mapped in the Mesquite Mine pits have not ruptured the 35,000 to 40,000 year old alluvial surfaces within the Mesquite project vicinity (Tosdal, et al. 1991).

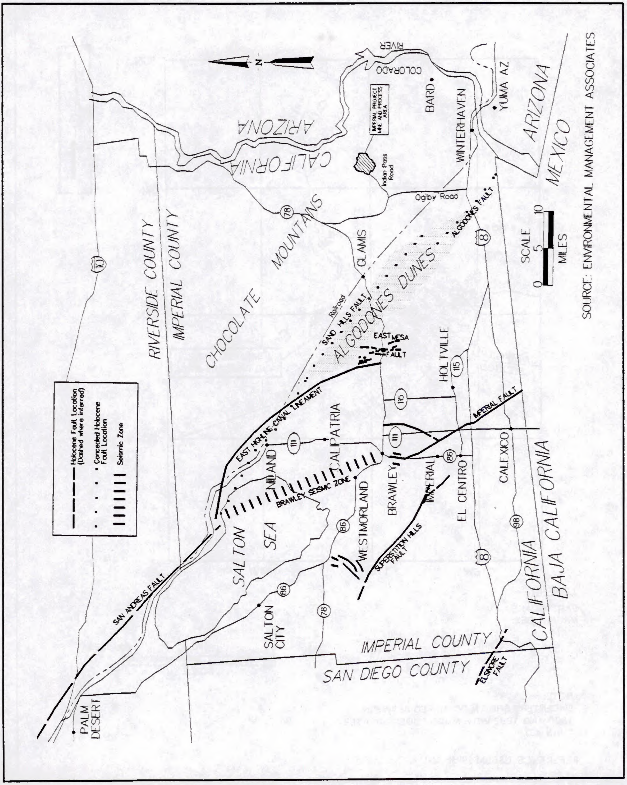

Figure 3.3: Regional Holocene Fault Map

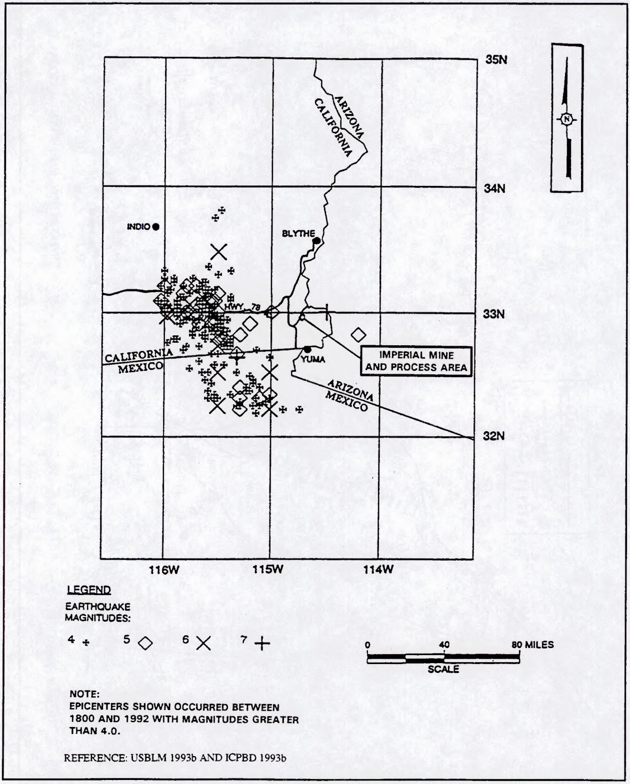

Figure 3.4: Historic Epicenter Map

3.1.2. Mineral Resources

The Project mine and process area is located midway between the historic Mesquite, Picacho, Tumco and Cargo Muchacho gold mining districts south of the Chocolate Mountains in eastern Imperial County, California (see Figure 3.5). The first gold mining in the region is attributed to early Spanish communities in the Cargo Muchacho Mountains in 1780 (Clark 1970). Mining interest in the region increased soon after the Mexican War in 1848 and the advent of the California Gold Rush in 1849, and peaked between 1870 and 1930. Production from the mines at Picacho, Tumco, and American Girl peaked in the early 1900's, producing a cumulative total of approximately 500,000 ounces of gold. Scattered, small-scale dry wash placer operations were attempted throughout the region and many small tailings piles from these operations are still visible. Increasing gold prices and bulk tonnage leaching technology developed in the 1970's led to exploration and subsequent development of open pits at the Picacho Mine in 1979, and the Mesquite and American Girl mines in 1980.

Little mining history exists for the Project mine and process area itself. Bedrock exposed in limited locations on the north side of the Project mine and process area was first prospected by Dick and Alice Singer (Personal Communication, Steve Baumann, Chemgold, 1995). Between 1982 and 1985, Gold Fields Mining Corporation conducted a regional exploration program comprised of aeromagnetic, gravity and resistivity surveys and stream wash geochemical studies. Gravity anomalies, low-grade mineralization in exposed bedrock, and a very limited drilling program led to the discovery of minor mineralization in the fringe areas of the current Imperial Project mine and process area.

In 1987, Glamis Gold Exploration, Inc. (GGX) acquired the mining claims and began exploration drilling through a joint venture agreement with a third party. In 1994, GGX became the sole owner and operator of the claims and initiated an accelerated development drilling and pre-feasibility program. This program ultimately culminated in the delineation of the three (3) ore bodies designated by the proposed East Pit, Singer Pit and West Pit. In 1997, all of the claims were assigned to Glamis Imperial Corporation (Personal Communication, Steve Baumann, Glamis Imperial, 1997).

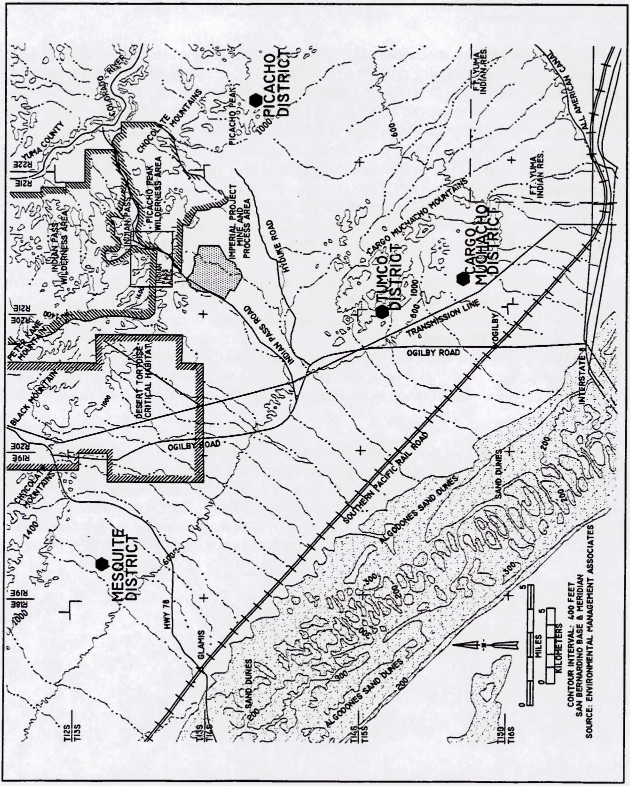

Figure 3.5: Historic Mining Districts in the Vicinity of the Imperial Project

Gold and silver mineralization at the Project mine and process area occurs in Jurassic-age granitic gneiss in the upper plate of the Chocolate Mountains thrust (see Figure 3.1). The thrust has an estimated throw of 48 kilometers to the northeast, moving gneiss and intrusive rocks over greenschist facies schists. Analysis of drill information indicates that the deposit's geology is similar to that observed at the nearby Picacho Mine and Mesquite Mine gold deposits. The mineralization occurs in sub-tabular blocks averaging 200 to 300 feet thick and is structurally controlled by the intersection of low-angle and high-angle shear zones which are localized to the ore body (see Figure 3.2) (Personal Communication, Dan Purvance, Chemgold, 1996). Gold and silver are associated with limonite and hematite in highly sheared and brecciated gneiss, and minor hydrothermal alteration is present as a weak form of sericitization. Oxidation extends to depths in excess of 1,500 feet below ground surface and, to date, no pyrite or other sulfide minerals have been observed in the ore or waste rock, other than oxidized remnants of pyrite in some drill cuttings.

No other economically recoverable mineral resources are known within the Project area.

3.2. Soil Resources

A report of the soil inventory conducted for the Project mine and process area was prepared in June, 1995 (Bamberg and Hanne 1995a; see Attachment D to Appendix A). The inventory report identified the various soil series mapped in the Project mine and process area, discussed the salvage potential and suitability of the soil material for reclamation activities, and contained recommendations for reclamation and revegetation activities in the area.

Most of the Project mine and process area is covered by desert pavement. The dominant mapped soil units are generally representative of relic paleosoils which formed under cool, moist conditions, not the hot, arid conditions of the current climate. A summary of the principal characteristics of the four (4) soil units identified in the Project mine and process area are presented in Table 3.1. The most notable aspects of the four (4) major types of soil are: coarse texture with large fragments; low organic matter and few available nutrients; high salts and excess alkalinity; and, in some of the soils, high concentrations of other chemicals, such as boron and nitrates. Soil depths vary from as shallow as two (2) inches to generally less than 24 inches.

Table 3.1: Summary of Soil Characteristics within the Project Mine and Process Area

Taxonomic and Mapping Unit	Classification	Topographic Position	Unit Salvageable (percent)	Salvage Volume (cu.yd.)	Soil Depth (in.)	Primary Salvage Limitations
A (Laprosa/Rock outcrop complex)	Exposed weathered gneiss and sandy-skeletal, mixed, lithic Haplocalcids	Low ridges, dissected	0	0	0-20	Rock outcrop, surface rubble
B	Sandy-skeletal, mixed hyperthermic, Torriopsamments	Recent alluvial fans and washes	50	16,800	0-20	Gravel texture, rock
C	Sandy-skeletal, mixed hyperthermic Torriopsamments	Shallow washes along drainages	65	26,200	18-24	Shallow, narrow extent
D	Sandy-skeletal, mixed, hyperthermic Petrocalcids	Old alluvial upland flats and slopes	3	69,200	0-24	Salt content, mixed alluvium, rock

Source: Bamberg and Hanne 1995a

3.3. Hydrologic Resources

3.3.1. Surface Waters

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: include a discussion of flood zones; add a discussion of the small, ephemeral seeps located in the vicinity of the Project ground water well field area; and add a new delineation of "waters of the United States."

The Project area is located within the Salton Sea Drainage, a closed hydrologic basin in which all surface flows drain toward the Salton Sea, a saline water body which has no outlet. However, surface water which flows from or through the general vicinity of the Project area (herein termed the "Indian Wash Drainage Basin") is prevented from reaching the Salton Sea by the Algodones Sand Dunes, a natural topographic constraint located approximately 12 miles downstream of the Project mine and process area to the southwest (see Figure 3.5). Surface flows either evaporate or infiltrate into the wash bottoms or outwash areas east of the Algodones Sand Dunes.

There are no free-standing surface waters present within the Project area or vicinity. There are no springs, seeps or streams within the Project area. The region's low precipitation rate, coupled with the high evaporation rate and the presence of highly permeable soils in the washes, preclude the formation of perennial or intermittent streams. The perennial water source located closest to the Project mine and process area is the Colorado River, approximately seven (7) miles northeast of the Project mine and process area at its closest point, which is outside of the Salton Sea Drainage Basin, on the other side of the Chocolate Mountains. The perennial water sources located within the Salton Sea Drainage Basin closest to the Project mine and process area are the All American Canal, approximately sixteen (16) miles south, and the Coachella Canal, a branch of the All American Canal, approximately nineteen (19) miles southwest, on the other side of the Algodones Sand Dunes.

The All American Canal, which transports water from the Colorado River, is the primary source of water within the Salton Sea Drainage Basin.

Several small, isolated, ephemeral water seeps are located northwest to southwest of the Project ground water well production area, in the vicinity of or adjacent to the Algodones Sand Dunes, at a distance of five (5) miles or more from the Project water production well area and more than eight (8) miles from the Project mine and process area (Personal Communication, Randy Rister, ICFGC, June 26, 1997). The source of the water for the seeps has not been identified in any area hydrologic studies; however, because the depth to ground water in the Project ground water well field area is several hundred feet below ground surface, it is believed that the seeps result from near-surface flows of water as sub-flow in ephemeral stream channels, or the seepage of precipitation which falls on the Algodones Sand Dunes.

3.3.1.1. Surface Flows

Surface water drainages within the Project area consist of a series of subparallel ephemeral washes which are fed by precipitation from infrequent winter storms and summer thunderstorms. Four (4) primary washes flow into the Project mine and process area (herein named the West Pit West, West Pit East, East Pit West, and East Pit East). Two (2) of these washes (West Pit East and East Pit West) flow together within the Project mine and process area, such that only three (3) major washes (West Pit West, Central, and East Pit East) exit the Project mine and process area (see Figure 3.6). Central Wash and East Pit East Wash flow into Indian Wash approximately two (2) miles downstream of the Project mine and process area, and West Pit East and Indian Wash each eventually end in individual areas of infiltration on the eastern edge of the Algodones Sand Dunes (see Figure 3.5).

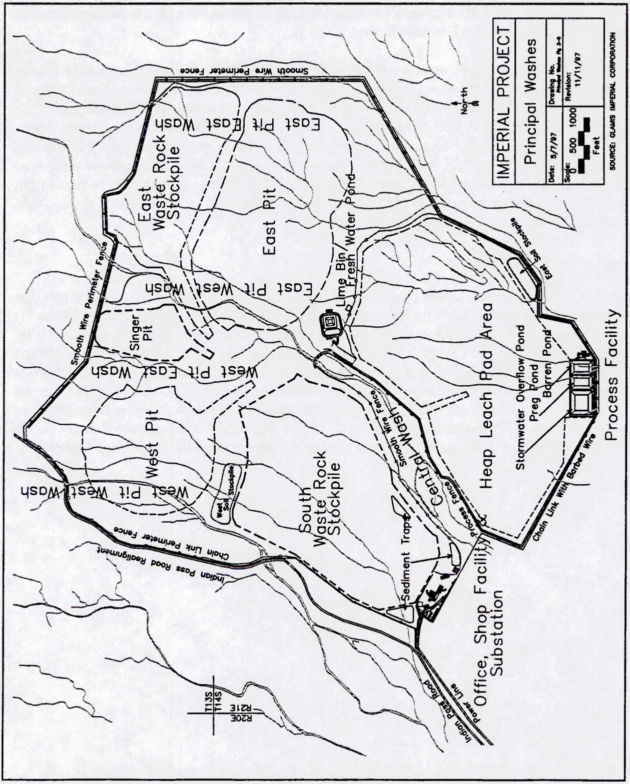

Figure 3.6: Principal Washes Within the Project Mine and Process Area

The local catchment areas for these four (4) washes were determined (see Figure 3.7), and estimates of peak flow in each of the washes at the upstream boundary of the Project mine and process area calculated, through use of a simple computer model, for the 100-year, 6- and 24-hour, and the 500-year, 24-hour storm events (Hanson 1997a; Hanson 1997c). Table 3.2 presents these catchment areas and peak flow estimates for these storms for each of the four (4) washes.

Table 3.2: Estimated Peak Runoff In Washes Through the Project Mine and Process Area

Storm Event	**Precipitation (inches)**	**Peak Runoff by Diversion (cubic feet per second)**				
		West Pit West	**West Pit East**	**Singer Pit**	**East Pit West**	**East Pit East**
		Catchment Basin Area				
		3.00 miles^2	0.974 miles^2	0.27 miles^2	1.30 miles^2	0.684 miles^2
100-year/6-hr	N/A	2,121	888	N/A	1,025	518
100-year/24-hr	4.8	2,043	727	364	925	492
500-yr/24-hr	N/A	2,927	1,083	N/A	1,394	704

Source: Hanson 1997a; Hanson 1997b

3.3.1.2. Water Quality

No direct data regarding the quality of the surface waters which occasionally flow through the Project area are available. Because water flows in these washes only during infrequent storm events, and because there is no substantial surface disturbance nor unusual natural sources of contaminants located upstream, the quality of the water flows are assumed to be typical of similar desert washes (i.e. very high in suspended solids and variable in dissolved solids). Based upon observations made in the field (EMA 1996a), the principal throughgoing stream channels appear to be currently undergoing very little geomorphic change.

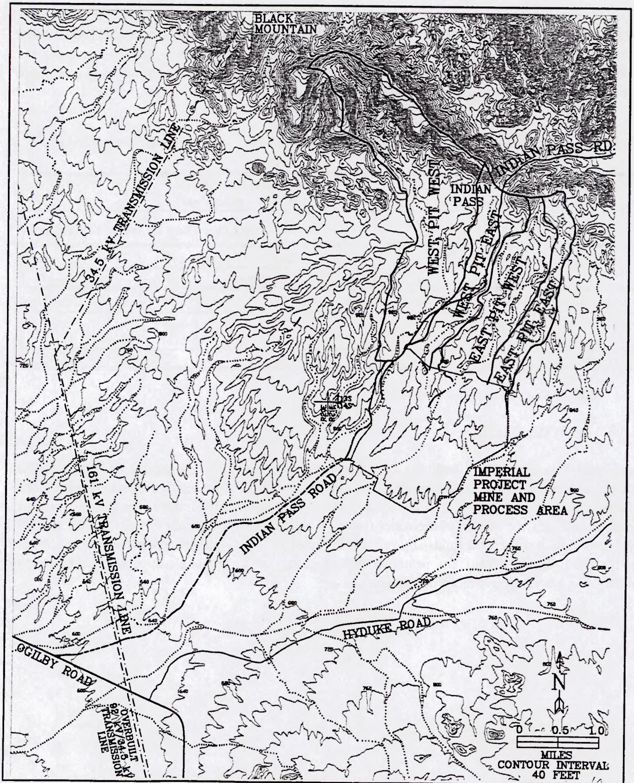

Figure 3.7: Watersheds Upstream of Project Mine and Process Area

3.3.1.3. Flood Zones

Federal Emergency Management Agency (FEMA) National Flood Insurance Program Flood Insurance Rate Map (FIRM) for Imperial County, California (Unincorporated Areas), Panel 700 of 1175, Community-Panel Number 060065 0700 B, Effective Date: March 15, 1984, provides National Flood Insurance Program designations for flood hazard areas in and around the Project area at a scale of 1:24,000. In the immediate vicinity of the Project area, only two (2) flood hazard zones are designated: Zone C, "Areas of minimal flooding;" and Zone A, "Areas of 100-year flood, base flood elevations and flood hazard factors not determined." Based upon an evaluation of the FEMA map, all areas in the vicinity of the Project area are labeled as "Zone C" except for two (2) narrow areas: one (1) along the ephemeral stream channel adjacent to and northwest of Indian Pass Road; and one (1) along the ephemeral stream channel which, in its upper reaches, is located immediately southeast of the Project mine and process area (see Figure 3.8).

Executive Order 11988, effective May 24, 1977, requires federal agencies to take certain actions to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains, which are defined in the same manner as FEMA. Section 3(d) requires each agency, in any right-of-way to be granted in or across a floodplain, to reference in the conveyance those uses that are restricted under identified federal, state or local floodplain regulations, and attach other appropriate restrictions to the uses of the land properties or withhold the grant.

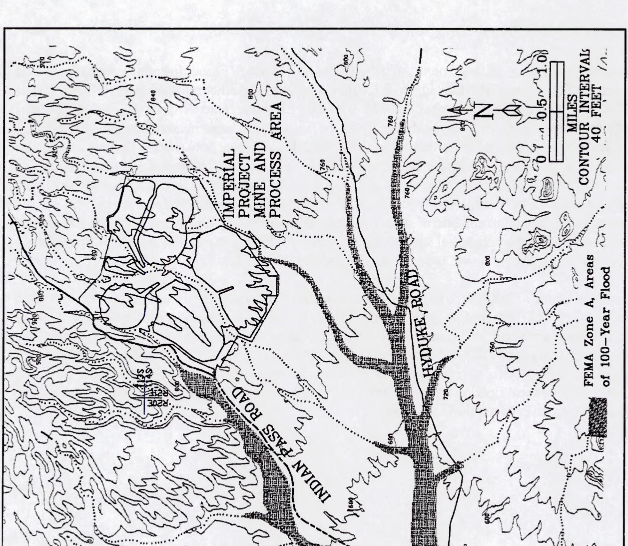

Figure 3.8: FEMA Floodplain Zones in the Vicinity of the Project Area

3.3.1.4. "Waters of the United States"

The U.S. Army Corps of Engineers (ACOE), under Section 404 of the Clean Water Act, regulates the discharge of dredged or fill material into "waters of the United States" (33 USC 1251-1376). Permits must be obtained from the ACOE prior to initiating discharges into jurisdictional "waters of the United States." Pursuant to applicable regulations (40 CFR 230.10), no permit for the discharge of dredged or fill material would be granted by the ACOE if: there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem; or if the discharge causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable state water quality standard; violates any applicable toxic effluent standard or prohibition; jeopardizes the continued existence of species listed as endangered under the federal Endangered Species Act; causes or contributes to substantial degradation of the "waters of the United States"; or unless appropriate and practicable steps have been taken which would minimize potential adverse impacts of the discharge on the aquatic ecosystem. Pursuant to 33 CFR 325.4, the ACOE may take into account the existence of controls imposed under other federal, state, or local programs which would achieve the objective of the desired condition, or the existence of an enforceable agreement between the applicant and another party concerned with the resource in question.

"Waters" are broadly defined at 33 CFR 328.2 to include non-tidal waters, including intermittent watercourses (commonly known as 'isolated waters') (33 CFR 328.3(a)(3)) and tributaries to such watercourses (33 CFR 328.3(a)(5)). "Isolated waters of the United States" include "All other waters such as *intrastate* lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce...", including those "which are or would be used as habitat by birds protected by Migratory Bird Treaties; or which are or would be used as habitat by other migratory birds which cross state lines; or which are or would be used as habitat for endangered species; or used to irrigate crops sold in interstate commence" (51 FR 41217).

The limits of ACOE jurisdiction on "non-tidal waters of the United States" extend to the "ordinary high water mark" (OHWM), in the absence of adjacent wetlands (33 CFR 328.4(c)(1)); or beyond the OHWM to the limits of the adjacent wetlands, when adjacent wetlands are present (33 CFR 328.4(c)(2)); or to the limits of the wetlands when only wetlands are present (33 CFR 328.4(c)(3)).

Surveys were performed to identify "waters of the United States," including wetlands, in and around the Project mine and process area (LSA 1997a [see Appendix D]). The surveys inventoried each of the principal throughgoing ephemeral washes within the Project mine and process area, as well as all tributaries, to determine which met the criteria of "waters" and "waters of the United States" (see Figure 3.9). No wetlands were identified within the Project mine and process area. However, 114.5 acres of land within the Project mine and process area were determined to be within the OHWM of the washes, and thus were determined to be "waters" under the applicable definitions

(LSA 1997a). All of the 114.5 acres were determined to qualify as "waters of the United States," although some upland areas (i.e. islands within braided systems) were included that were not within the jurisdictional "waters of the United States" as a matter of expediency. It is expected that were a detailed, intensive survey of all areas encompassing "waters of the United States" to be conducted, it would reveal that the actual extent of ACOE jurisdictional "waters" is less than 114.5 acres (LSA 1997a). This delineation has been submitted to the ACOE for concurrence; however, as of September 1997, the ACOE has not responded (Personal Communication, Jack Easton, LSA Associates, Inc., September 12, 1997).

The 114.5-acre jurisdictional "waters of the United States" area consists of ephemeral drainage courses and their tributaries which have the following characteristics (LSA 1997a):

- An "ordinary high water mark" (OHWM), which is evident along each of the jurisdictional drainage courses.

- Support, or are tributary to areas that support, vegetation that may be used as habitat by birds that are protected under Migratory Bird Treaties. Further, the vegetation supported by the intermittent streams is substantially different from the vegetation of the adjacent upland areas.

- Are non-tidal, not a part of a surface tributary system to interstate or navigable waters, and not adjacent to such tributary water bodies.

Based on these three (3) factors, identified drainage courses on the Project mine and process area are considered to meet the definition of "isolated waters of the United States," and are, therefore, subject to the jurisdiction and permitting authority of the ACOE. Tributaries to "isolated waters of the United States" are also subject to the ACOE's jurisdiction and permitting authority. Due to the absence of any hydrophytic vegetation, none of the jurisdictional drainage courses meet the definition of "wetlands."

3.3.2. Ground Waters

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: clarify the relationship of the ground waters in the Project area to the Colorado River aquifer; and reduce the estimated quantity of water seeping from All American Canal to the Amos-Ogilby-East Mesa Basin.

The Project area is located within what has recently been termed the Amos-Ogilby-East Mesa ground water basin (Environmental Solutions, Inc. 1993a; WESTEC, Inc.1996a), which is roughly equivalent to the "Sand Hills Area" and "East Mesa Area" described by Dutcher, et. al. (1972). The basin is a northwesterly trending, elongated area of approximately 860 square miles within the southeastern portion of Imperial County, California, but which likely extends for hundreds of additional square miles into northern Mexico. It is bounded on the northeast by the Chocolate

Mountains, on the north by the surface drainage/ground water divide which separates the Amos Basin from the East Salton Sea Basin, on the west by the finer sediments in the irrigated portion of the Imperial Valley, and to the south by the arbitrary political boundary with Mexico (see Figure 3.10). The alluvial sediments which make up the water-bearing aquifer range in thickness from zero (0) feet on the eastern boundary at the Chocolate Mountains to as much as 10,000 feet at the western boundary in the Imperial Valley (Environmental Solutions, Inc. 1993a).

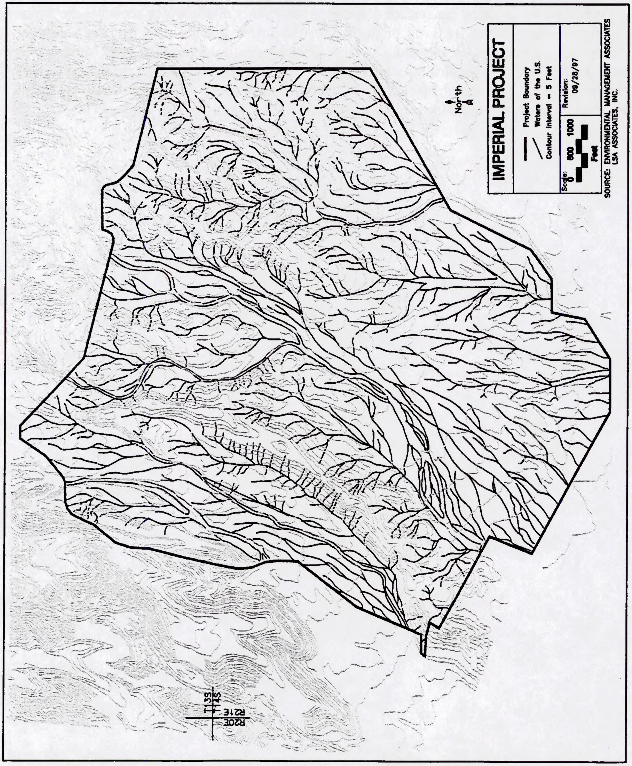

Figure 3.9: Delineated "Waters of the United States" Within the Project Mine and Process Area

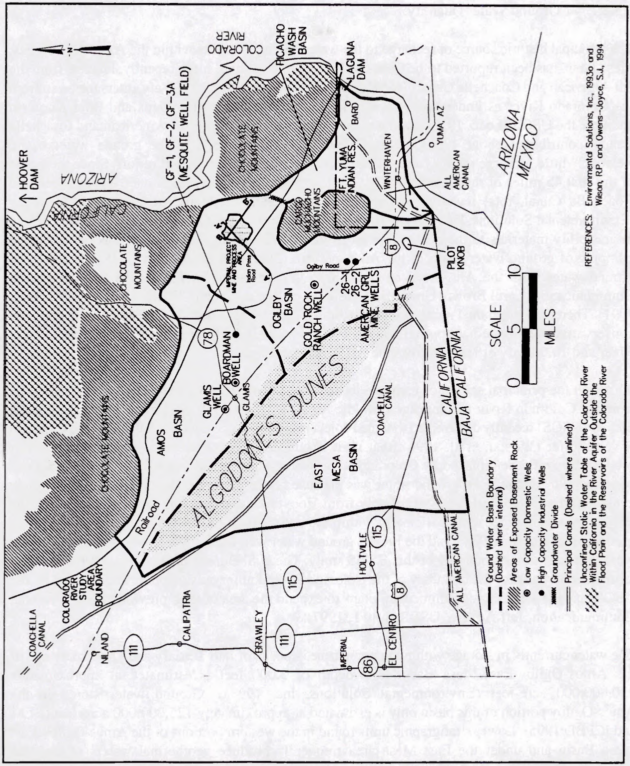

Figure 3.10: Amos-Ogilby-East Mesa Ground Water Basin and Ground Water Production Wells Near the Project Area

3.3.2.1. Ground Water Quantity

The principal historic source of recharge to the water-bearing deposits within the Amos-Ogilby-East Mesa Basin has been reported to be from the Colorado River and, more recently, leakage from the All American and Coachella Canals (see Figure 3.10). An estimated 20,000 afy enters the basin from the Colorado River as underflow between the Cargo Muchacho Mountains and Pilot Knob. In addition, the USGS (Loetz 1975) estimated that in the late 1960's, the All American and Coachella Canals contributed about 100,000 and 130,000 afy, respectively, to the ground water basin. Relatively little recharge comes from infiltration of local precipitation and runoff. Since the lining of the first 45 miles of the Coachella Canal in the 1980's essentially eliminated leakage from the Coachella Canal, total recharge to the basin was roughly estimated in 1993 at 100,000 afy (Environmental Solutions, Inc. 1993a). However, it is currently believed that the distribution of low permeability materials to the north and east of the All American Canal, as well as the extensive pumping of ground water south of the All American Canal in Mexico, may limit the seepage of ground water from the All American Canal into the Amos-Ogilby-East Mesa basin (Personal Communication, Carol Brown, United States Bureau of Reclamation [USBR], April 21, 1997; Watt 1991). Therefore, the annual recharge into the Amos-Ogilby-East Mesa Basin may be more correctly conservatively estimated at approximately 30,000 afy; 20,000 afy of seepage from the Colorado River and 10,000 afy of leakage from the All American Canal.

Although the principal source of recharge to the Amos-Ogilby-East Mesa Basin is reported to be from the Colorado River and leakage from the All American Canal, the United States Geological Survey (USGS) recently determined that the Project mine and process area is outside of the Colorado River aquifer (Wilson, et al. 1994); that is, it is outside of that area from which ground water production would be replaced by Colorado River water, and thus no federal water appropriations permit would be required if ground water was produced from this area. However, this USGS study evaluated the Colorado River system only from Hoover Dam to Laguna Dam, and although the Project mine and process area is clearly within the boundary of the USGS study area, the Project ground water test well PW-1 and the Project ground water well field are located immediately to the west (outside) of the boundary of this USGS study. The U.S. Bureau of Reclamation has recently terminated its study of the boundary of the Colorado River aquifer outside of the area studied by the USGS, and the USGS has no immediate plans to expand the area of their previous study (Personal Communication, Jeff Adagio, USBR, July 1, 1997).

The water currently in storage within the nonmarine deposits of late Tertiary and Quaternary age of the Amos-Ogilby-East Mesa Basin to a depth of 3,000 feet is estimated at approximately 230,000,000 acre-feet (Environmental Solutions, Inc. 1993a). Ground water stored in the Amos-Ogilby portion of this basin only is estimated at approximately 126,000,000 acre-feet (BLM and ICPBD 1995). Lower stratigraphic units found in the western portions of the Amos-Ogilby-East Mesa Basin and under the East Mesa area frequently produce geothermal waters of elevated temperature (Dutcher, et. al. 1972).

The area of the local catchment upgradient of the Project ground water well field area has been estimated at approximately 30,000 acres. Since the average annual rainfall at the neighboring Gold Rock Ranch is approximately 3.60 inches (or 0.3 feet) (GSi/Water 1993), a conservative average of 9,000 afy of precipitation falls within the catchment area. However, since nearly all of the precipitation falling within the catchment area evaporates or is consumed by plants in the vegetated portions of the basin, relatively little precipitation infiltrates and actually provides basin recharge (Environmental Solutions, Inc. 1993a). Estimates of the infiltration percentage range from one (1) to ten (10) percent, which translates to 90 to 900 afy of ground water recharge into the basin upgradient of the Project well field production area (GSi/Water 1993).

The Project area is underlain by undifferentiated alluvial and lacustrine deposits of Quaternary and Tertiary age which rapidly thicken from the Chocolate Mountains towards the desert floor to the southwest (Personal Communication, Dan Purvance, Chemgold, 1996). The alluvium within the Project mine and process area ranges from 10 feet to as much as 1,000 feet in places (WESTEC, Inc. 1996a).

Ground water beneath the Project area occurs within three (3) different aquifers (see Figure 3.11 and Figure 3.12): an unconfined alluvial aquifer (the uppermost aquifer, which has a water table which is open to direct infiltration); a confined alluvial aquifer (which is bounded both above and below by relatively low permeability (impermeable) beds); and a bedrock aquifer. The alluvial aquifers consist of consolidated and unconsolidated sands and gravels. The bedrock aquifer is comprised of fractured and jointed gneissic and granitic rocks (WESTEC, Inc. 1996a).

Ground water flow within the Project area generally follows the topographic gradient, from the higher elevations toward the alluvial basin of the valley floor, and the ground water gradient is generally from the northeast to the southwest (WESTEC, Inc. 1996a).

Two (2) ground water monitoring wells, thirteen (13) piezometer holes, and one (1) ground water production test well were installed by Glamis Imperial and its consultants in order to obtain more specific information regarding the characteristics of the alluvial and bedrock aquifers in the Project area (WESTEC, Inc. 1996a, and EMA 1996c; see Appendix E-1 and Appendix E-2 of this EIS/EIR). Figure 3.13 is a map of the locations of these holes and wells and the static ground water levei (potentiometric) surface derived from these holes and wells. Table 3.3 provides the physical data (name, location, depth to ground water, and aquifer) for those holes and wells from which water quality data has been obtained.

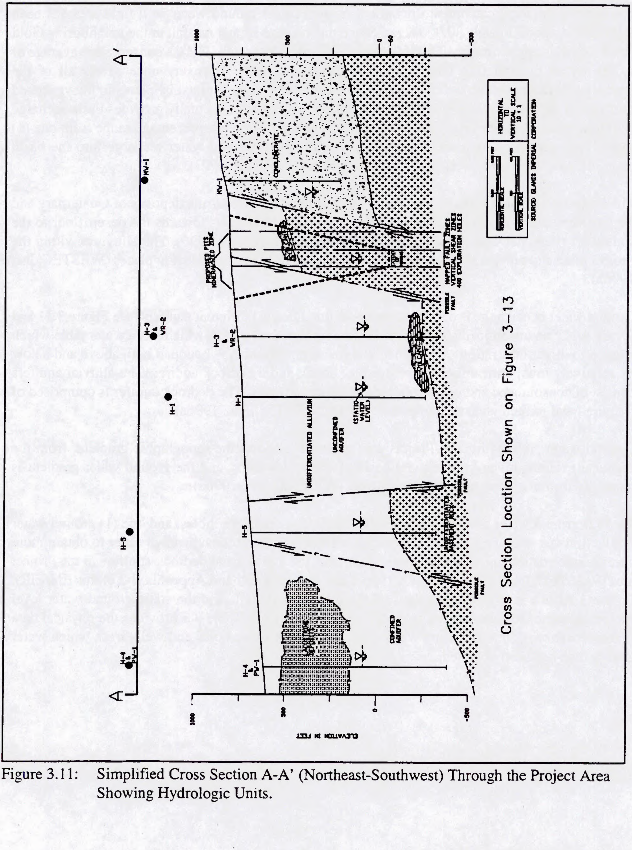

Figure 3.11: Simplified Cross Section A-A' (Northeast-Southwest) Through the Project Area Showing Hydrologic Units.

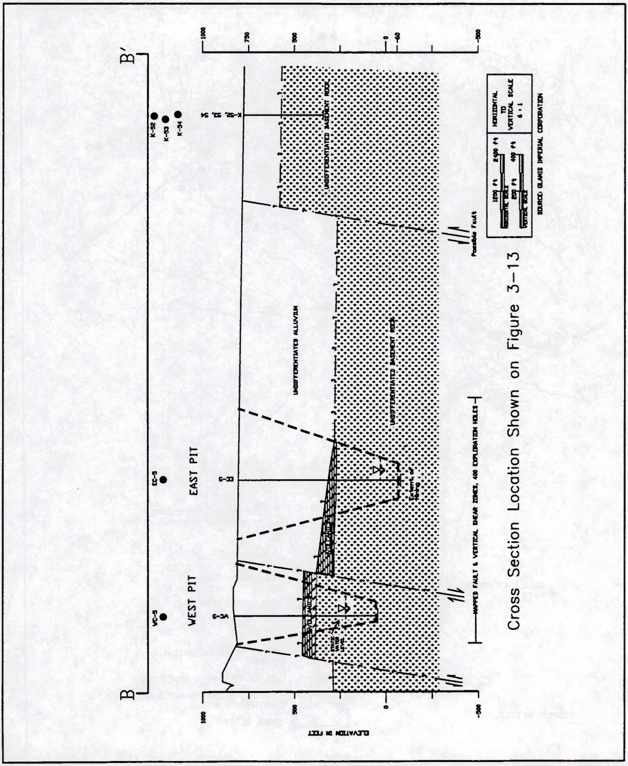

Figure 3.12: Simplified Cross Section B-B’ (Northwest-Southeast) Through the Project Area Showing Hydrologic Units

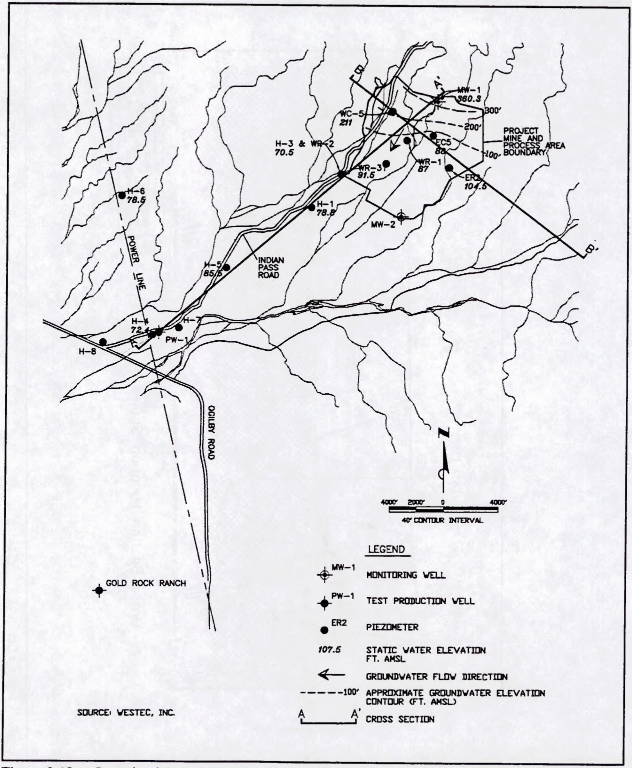

Figure 3.13: Location Map of Imperial Project Area Piezometer Holes, Monitor and Test Production Wells and Ground Water Potentiometric Map

Table 3.3: Summary of Physical Data From Selected Piezometer Holes, Monitoring Wells, and Test Production Well

Hole Number	Location	Total Depth (ft bgs)	Depth to Static Water (ft bgs)	Aquifer
Piezometer Holes				
H-1	Mine and Process Area	1,000	657.2	Alluvial (unconfined)
H-2	Abandoned	N/A	N/A	N/A
H-3	Mine and Process Area	1,100	695.0	Bedrock
H-4	Ancillary Area	1,000	545.0	Alluvial (confined)
H-6	Ancillary Area	1,080	545.0	Alluvial (unconfined)
H-6	North of Ancillary Area	900	631.0	Alluvial (confined)
H-8	Ancillary Area	950	528.0	Alluvial (confined)
H-8	Indian Pass/Ogilby Rd.	950	480.0	Alluvial (confined)
ER-2	Mine and Process Area	900	522.0	Bedrock
EC-5	Mine and Process Area	1,800	720.0	Bedrock
WR-1	Mine and Process Area	910	734.0	Bedrock
WR-31	Mine and Process Area	900	682.0	Alluvial (unconfined)
WC-5	Mine and Process Area	800	695.0	Bedrock
WR-2	Mine and Process Area	945	694.5	Alluvial (unconfined)
Monitoring Wells				
MW-1	Mine and Process Area	640	479.7	Conglomerate (bedrock)
MW-2	Mine and Process Area	880	626.2	Bedrock
Test Production Well				
PW-1	Water Supply Area	960	544.4	Alluvial (confined)

Source: WESTEC, Inc. 1996a; EMA 1996c

Static ground water elevations measured in the wells completed in the alluvial aquifers (94H-1, WR-2, and PW-1) ranged from a high of 360 feet AMSL immediately northeast of the Project mine and process area to a low of 70.5 feet AMSL in the southwest corner of the Project mine and process area, which produces a gradient from northeast to southwest. Variations in measured static water levels were attributed to the wells being completed in the different aquifers (WESTEC, Inc. 1996a; EMA 1996c).

Static ground water elevations measured in the bedrock aquifer (EC-5, WC-5, and MW-2) ranged from a high of 211 feet AMSL in the area of the proposed West Pit to a low of

85.5 feet AMSL approximately two (2) miles southwest of the Project mine and process area. With the exception of the elevation in the West Pit, all of the bedrock aquifer measurements produced an essentially flat surface; the anomalously high West Pit bedrock aquifer elevation was attributed to either the fracture-controlled nature of the aquifer or an unknown ground water barrier between the two (2) proposed pits (WESTEC, Inc. 1996a).

Aquifer testing was performed in the Project area to evaluate the hydrogeologic characteristics of the underlying geologic materials (WESTEC, Inc. 1996a; see Appendix E-1 of this EIS/EIR). Slug tests were conducted in the piezometer wells completed in the confined alluvial and bedrock aquifers. Falling head tests were conducted in the bedrock piezometers; however, falling head tests could not be performed in the alluvial piezometers due to the increased permeability of the alluvial material that would not allow a sufficient column of water to be maintained in the well during the tests. Slug and falling head tests generally yield data that are of low confidence; however, the multiple tests conducted do give some indication of the permeability of the alluvial and bedrock aquifers. The results of the slug and falling head tests are shown in Table 3.4.

Table 3.4: Calculated Hydraulic Conductivities of Alluvial and Bedrock Aquifers

Hole Number	Test	Hydraulic Conductivity		Aquifer Formation
		cm/sec	ft/day	
H-4	Slug	2.8×10^{-3}	7.9	alluvial
EC-5	Slug	3.8×10^{-7}	1.1×10^{-3}	bedrock
WC-5	Slug	8.4×10^{-7}	2.4×10^{-3}	bedrock
EC-5	Falling Head	3.5×10^{-7}	9.9×10^{-4}	bedrock
WC-5	Falling Head	1.4×10^{-6}	4.0×10^{-3}	bedrock
H-5	Slug	1.05×10^{-2}	29.8	bedrock

Source: WESTEC, Inc. 1996a; EMA 1996c

Well H-5 was screened in highly fractured bedrock and the hydraulic conductivity calculated from the slug test is much higher than those calculated from slug tests conducted on wells EC-5 and WC-5. In addition, wells EC-5 and WC-5 are both located in the mine and process facilities area and well H-5 is located approximately 3.3 miles to the southwest of the mine area. The different locations of the wells could account for fracture heterogeneities in the bedrock and the differences in the calculated hydraulic conductivities.

A constant rate pump and recovery test was conducted in the production test well (PW-1) completed in the confined alluvial aquifer. The pump test was conducted to evaluate the transmissivity and storage coefficient of the alluvial sediments in the vicinity of PW-1, which is located approximately 3.5 miles southwest of the Project mine and process area. A pumping test was conducted for

48-hours at a constant pumping rate of 500 gallons per minute (gpm). Ground water was produced from approximately 200 feet of saturated alluvial sediments, equivalent to the length of the screened interval, at a depth between 718 and 918 feet below ground surface (bgs). Piezometer H-4, located 91 feet west of PW-1, was used as an observation well to measure the drawdown effects of the pumping test on PW-1. The depth to ground water in PW-1 and H-4 was measured throughout the entire time the pumping test was being conducted. Total drawdown of ground water in PW-1 at the end of the 48-hour pumping test was 130 feet, most of which occurred during the first five (5) minutes of the test. The water level data collected during the pumping test were used to calculate the hydraulic characteristics of the confined alluvial aquifer using the Theis and Jacob methods (Kruseman 1991). The drawdown curve, showing the change in drawdown of the ground water in the observation well versus time, was matched with a Theis Curve for a confined aquifer showing leakage through one of the confining layers. The transmissivity (T), storativity (S), and hydraulic conductivity (K) of the confined alluvial aquifer, calculated from the pumping test and assuming a saturated thickness of 200 feet, are shown in Table 3.5.

Table 3.5: Calculated Aquifer Hydraulic Parameters From Pumping and Recovery Test

Method	Well	T (ft^2/day)	S	K (ft/day)	K (cm/sec)
Theis	H-4	1,645	0.03	8.0	2.8×10^{-3}
Cooper-Jacob	H-4 (drawdown)	2,701 - 5,403	0.003 - 0.02	14 - 27	4.9×10^{-3} - 9.5×10^{-3}
Cooper-Jacob	PW-1 (drawdown)	965 - 5,017	not calculated	5.0 - 25	1.8×10^{-3} - 8.8×10^{-3}
Cooper-Jacob	H-4 (recovery)	2,680 - 5,696	0.001	13 - 28	4.6×10^{-3} - 9.9×10^{-3}
Cooper-Jacob	PW-1 (recovery)	1,737 - 4,438	not calculated	9.0 - 22	3.2×10^{-3} - 7.8×10^{-3}

Source: WESTEC, Inc. 1996a

There is currently no ground water being produced from beneath the Project area. Limited pumping of ground water occurs from the Amos-Ogilby-East Mesa Basin in the immediate vicinity of the Project area, this from: a well located at Gold Rock Ranch (approximately four and one-half (4.5) miles southwest of the Project ground water well field area); two (2) wells located at the American Girl Mine (approximately eight (8) miles south of the Project ground water well field area); and three (3) production wells for the Mesquite Mine located southeast of the Mesquite Mine itself (and approximately eight (8) miles west-northwest of the Project ground water well field area) (see Figure 3.10). The produced ground water is authorized for mining and domestic uses.

The well at the Gold Rock Ranch is used to supply domestic water for the ranch. Current usage is estimated at 5,000 gallons per day (gpd) [less than six (6) afy], with an estimated historic maximum usage rate of 12,000 gpd (less than fourteen (14) afy), as estimated by the owner (BLM 1994a). Ground water usage for the American Girl Mine operations was reported as less than 200 afy (U.S.

Bureau of Land Management 1994b). However, American Girl Mine has recently curtailed mining and milling operations and has substantially reduced its water consumption. The rate of production of water from the Mesquite Mine wells was reported at approximately 1,500 afy (Environmental Solutions, Inc. 1993a).

3.3.2.2. Ground Water Quality

Ground water quality within the Amos-Ogilby-East Mesa Basin consistently shows levels of total dissolved solids (TDS), chloride, and fluoride which exceed drinking water standards (Environmental Solutions, Inc. 1993a). TDS concentrations range from 1,100 mg/l in the Mesquite Mine wells to greater than 3,000 mg/l in the Glamis and Boardman wells (WESTEC, Inc. 1996a). In general, the ground water is not suitable as drinking water without prior treatment, although the quality is sufficient for use in mining operations.

Table 3.6 provides water quality data for the Project ground water monitoring and production wells. Filtered samples from the upgradient monitoring well (MW-1) met all primary drinking water standards, but exceeded the secondary drinking water standards for TDS and manganese. The downgradient monitoring well (MW-2) met all primary drinking water standards except for arsenic, and exceeded secondary drinking water standards for chloride, manganese, sulfate, and TDS. The production test well (PW-1) met all primary drinking water standards except for fluoride, and exceeded secondary drinking water standards for chloride, iron, and TDS. TDS levels were at the lower end of the range for wells completed within the basin, and the water quality appears to be suitable for non-potable uses (WESTEC, Inc. 1996a) [see Appendix E-1]. Stiff and Piper diagrams (see Figure 3 in Appendix E-2) indicate that the dominant cation species are sodium and potassium, while the dominant anion varies from sulfate and carbonate/bicarbonate near the Project mine and process area to chloride and sulfate in the alluvial basin.

Table 3.6: Water Quality Data from Project Monitoring and Production Wells

Element	Units	Current Drinking Water Quality Standards	Well Number										
			MW-1	MW-1	MW-1	MW-1	MW-1 A	MW-1 B	MW-2	MW-2	MW-2 A	MW-2 B	PW-1
Collection Date			08/30/95	11/28/95	04/22/96	08/15/96	08/29/96	08/29/96	07/11/96	08/15/96	08/29/96	08/29/96	11/19/95
Field Filtering			unfiltered	unfiltered	unfiltered	unfiltered	filtered	unfiltered	unfiltered	unfiltered	filtered	unfiltered	filtered
Alkalinity	mg/l		138	183	183	171	183	186	246	169	95	195	32
Aluminum	mg/l	1.0 (1) 0.02 (2)	0.5	0.7	<0.1	0.3	<0.02	1.37	0.7	1.3	<0.02	4.03	<0.1
Antimony	mg/l	0.006 (1)	<0.5	<0.5	<0.04	<0.003	<0.005	<0.005	<0.003	<0.003	<0.005	<0.005	<0.002
Arsenic	mg/l	0.05 (1)	<0.005	0.005	0.02	<0.005	<0.01	0.01	<0.005	<0.005	0.09	0.11	0.009
Barium	mg/l	1.0 (1)	0.2	<0.1	0.2	<0.1	0.17	0.21	0.1	0.1	0.04	0.09	<0.1
Beryllium	mg/l	0.004 (1)	<0.1	<0.1	<0.002	<0.002	<0.001	0.001	<0.002	<0.002	<0.001	0.002	<0.0002
Bismuth	mg/l		<0.1	<0.1	<0.1	<0.1	<1	<1	<0.1	<0.1	<1	<1	<0.1
Boron	mg/l						0.50	0.53			4.95	5.06	
Cadmium	mg/l	0.005 (1)	0.0004	0.0006	<0.0002	<0.002	<0.005	<0.005	<0.002	<0.002	<0.005	<0.005	<0.0002
Calcium	mg/l		83	38	53	34	49.4	57.1	64	80	67.3	169	57
Chloride	mg/l	250 (2)	92	186	91	34	56.1	61.1	130	120	641	606	320
Chromium	mg/l	0.05 (1)	<0.1	<0.1	<0.1	<0.1	<0.01	0.03	<0.1	<0.1	<0.01	0.09	<0.1
Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.03	<0.01	<0.1	<0.1	<0.03	<0.03	<0.1
Field Conductance	μmhos/cm						832	832			2460	2460	
Copper	mg/l	1.0 (2)	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.1	<0.1	<0.01	0.03	<0.1
Fluoride	mg/l	1.0 (1)	0.2	0.6	0.2	0.3	0.6	0.6	0.2	0.2	0.1	0.6	1.6
Gallium	mg/l		<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	<0.5	<0.5	<0.1
Iron	mg/l	0.3 (2)	1.4	3.4	<0.1	0.2	<0.03	4.39	0.5	1.7	<0.03	6.64	0.4
Lead	mg/l		0.009	0.015	<0.002	<0.005	<0.003	0.049	<0.003	<0.005	<0.003	0.024	<0.002
Lithium	mg/l		<0.1	<0.1	<0.1	<0.1	0.04	0.06	<0.1	<0.1	0.58	0.67	0.1
Magnesium	mg/l		31	6	6.7	3.4	5.3	5.7	28	31	19.0	27.5	1.5
Manganese	mg/l	0.05 (2)	<0.1	0.3	0.1	<0.1	0.70	1.10	<0.1	0.20	0.09	0.50	<0.1
Mercury	mg/l	0.002 (1)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005
Molybdenum	mg/l		<0.5	<0.5	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	0.12	0.06	<0.5
Nickel	mg/l	0.1 (1)	<0.1	<0.1	<0.1	<0.1	<0.04	0.04	<0.1	<0.1	<0.04	0.08	<0.1

Element	Units	Current Drinking Water Quality Standards	Well Number										
			MW-1	MW-1	MW-1	MW-1	MW-1 A	MW-1 A	MW-2	MW-2	MW-2 A	MW-2 A	PW-1
Nitrate Nitrogen	mg/l	10 (1)	0.1	0.1	<0.1	<0.1	0.13	0.05	0.2	0.3	0.07	<0.05	1.9
pH	mg/l	6.8 - 8.5	7.99	8.6	7.47	7.29	7.69	7.51	7.79	7.49	7.79	7.64	8.2
Phosphorous	mg/l		<0.1	0.3	<0.1	<0.1	0.09	0.31	<0.1	<0.1	0.03	0.80	<0.1
Potassium	mg/l		6	6.9	4.7	4.7	6	10	8.6	5.9	10	20	0.1
Scandium	mg/l		<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.1	<0.1	<0.01	<0.01	<0.1
Selenium	mg/l	0.05 (1)	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.001	0.001	<0.01	<0.01	<0.001
Silver	mg/l	0.1 (2)	<0.0005	<0.0005	<0.0005	<0.002	<0.01	<0.01	<0.002	<0.002	<0.01	<0.01	<0.0005
Sodium	mg/l		130	200	160	150	159	135	140	150	537	463	260
Strontium	mg/l		1.8	1.2	4.5	0.3	4.28	4.19	1.3	1.3	2.57	2.61	0.8
Sulfate	mg/l	250 (2)	290	200	210	160	230	211	320	270	360	230	180
TDS	mg/l	500 (2)	799	712	656	529	620	640	728	804	1780	1690	906
Thallium	mg/l	0.002 (1)	<1	<1	<0.0005	<0.001	<0.002	<0.005	<0.001	<0.001	<0.002	<0.005	0.001
Tin	mg/l		<1	<1	<1	<0.5	<0.05	<0.05	<1	<0.5	<0.05	<0.05	<1
Titanium	mg/l		<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.1	0.1	<0.01	0.01	<0.1
Vanadium	mg/l		<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.05	<0.05	<0.1
Zinc	mg/l	5.0 (2)	0.3	0.9	<0.1	<0.1	<0.01	0.06	<0.1	0.1	<0.01	0.26	<0.1

(1) California Primary Maximum Contaminant Limit
(2) California Secondary Maximum Contaminant Limit
Source: WESTEC, Inc. 1996a; Personal Communication, Dan Purvance, Glamis Imperial, 1997

3.4. Air Resources

3.4.1. Regulatory Framework

Ambient air quality and the emission of air pollutants are regulated under both federal and California laws and regulations. In addition, there are local requirements and standards which provide regulation of both air quality and the emission of air pollutants in the Project area.

The federal Clean Air Act (CAA), and the subsequent Clean Air Act Amendments of 1990 (CAAA), requires the U.S. Environmental Protection Agency (USEPA) to identify national ambient air quality standards (NAAQSs) to protect public health and welfare. NAAQSs have been established for six (6) pollutants, known as "criteria" pollutants because the standards satisfy "criteria" specified in the CAA. A list of the criteria pollutants regulated by the CAA, and the NAAQSs set by the USEPA for each, are listed in Table 3.7.

Table 3.7: Federal and State Ambient Air Quality Standards for Criteria Pollutants

Criteria Pollutant	Averaging Period	California Standards	Federal Standards	
		Concentration[a]	Primary[a]	Secondary[a]
Ozone (O_3)	1-Hour	90 ppbv (180 $\mu g/m^3$)	120 ppbv (235 $\mu g/m^3$)	Same as Primary Standards
Carbon Monoxide (CO)	8-Hour	9 ppmv (10 mg/m^3)	9 ppmv (10 mg/m^3)	-
	1-Hour	20 ppmv (23 mg/m^3)	35 ppmv (40 mg/m^3)	
Oxides of Nitrogen (NO_x) as Nitrogen Dioxide (NO_2)	Annual	-	53 ppbv (100 $\mu g/m^3$)	Same as Primary Standards
	1-Hour	250 ppbv (470 $\mu g/m^3$)	-	
Sulfur Dioxide (SO_2)	Annual	-	30 ppbv (80 $\mu g/m^3$)	-
	24-Hour	40 ppbv (105 $\mu g/m^3$)	140 ppbv (365 $\mu g/m^3$)	-
	3-Hour	-	-	500 ppbv (1,300 $\mu g/m^3$)
	1-Hour	250 ppbv (655 $\mu g/m^3$)	-	-
Particulate Matter ≤ 10 Microns in Diameter (PM_{10})	Annual Geometric Mean	30 $\mu g/m^3$	-	-
	24-Hour	50 $\mu g/m^3$	150$\mu g/m^3$	Same as Primary Standards
	Annual Arithmetic Mean	-	50 $\mu g/m^3$	
Sulfates (SO_4)	24-Hour	25 $\mu g/m^3$	-	-
Lead (Pb)	30-Day	1.5 $\mu g/m^3$	-	-
	Calendar Quarter	-	1.5 $\mu g/m^3$	Same as Primary Standards
Hydrogen Sulfide (H_2S)	1-Hour	30 ppbv (42 $\mu g/m^3$)	-	-

[a]Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm mercury. Measurements of air quality are corrected to a reference temperature of 25°C and a reference pressure of 760 mm mercury (1,013.2 millibar); ppmv and ppbv in this table refer to parts by million by volume and parts per billion by volume, respectively, or micro-moles of pollutant per mole of gas. $\mu g/m^3$ ≡ micrograms per cubic meter (CARB 1994).

In addition to the NAAQSs listed in Table 3.7, on July 16, 1997 the USEPA adopted revisions to the current primary NAAQSs for particulate matter less than 10 microns in diameter (PM_{10}) and ozone (O_3) (62 *Federal Register* 38652-38760; 62 *Federal Register* 38856-38896). Under these newly adopted standards, the USEPA will be phasing out the current 1-hour O_3 standard (once an area is meeting the 1-hour standard) and adopting a new, 0.08 ppm, 8-hour O_3 standard, effective September 15, 1997, to protect against longer exposures. In addition, the USEPA has added two (2) new primary standards for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$); a 15 $\mu g/m^3$, three (3)-year, annual arithmetic mean standard; and a 65 $\mu g/m^3$, 24-hour average, standard meeting the 98th percentile, averaged over three (3) years. USEPA is also adjusting the current 24-hour PM_{10} standard from a 1-expected-exceedence to a 99th percentile form, averaged over three (3) years. The annual mean PM_{10} standard would remain unchanged.

At present, a USEPA-accepted monitoring network for ambient $PM_{2.5}$ does not exist, and as such it is expected to take until the year 2003 before sufficient ambient $PM_{2.5}$ measurements can be obtained to allow the USEPA to establish attainment status designations. Depending upon the status of compliance with the current NAAQSs for PM_{10} and the pace with which ambient $PM_{2.5}$ concentrations are established and compliance plans developed and adopted, states may have up to the year 2017 to meet these new $PM_{2.5}$ standards.

The California Air Resources Board (CARB), which is part of the California Environmental Protection Agency (Cal-EPA), is the California state agency to which the USEPA has delegated primary responsibility for implementation within California of those portions of the CAA, as amended, which entail the day-to-day regulatory functions and contacts with source operators. Under §40002 of the California Health & Safety Code, jurisdiction for air quality and regulation of emissions from all sources other than motor vehicles within Imperial County, including the Project area, has been delegated to the Imperial County Air Pollution Control District (ICAPCD).

The CARB also has the responsibility for establishing California Ambient Air Quality Standards (CAAQSs) under the California Clean Air Act (CCAA). The CAAQSs are generally equal to or more stringent than the NAAQSs. A list of the California "criteria" air pollutants, and the CAAQS adopted for each, are also included in Table 3.7.

Pursuant to the CAA, the USEPA has developed classifications for distinct geographic regions known as air basins. Under these classifications, for each federal criteria pollutant, each air basin (or portion of an air basin, known as a "planning area") is classified as in "attainment" (if the air basin (or planning area) has "attained" compliance with (that is, not exceeded) the adopted NAAQS for that pollutant), or is "non-attainment" (if the levels of ambient air pollution exceed the NAAQS for that pollutant). Air basins which have not received sufficient analysis for certain criteria pollutants are designated as "unclassified" for those particular pollutants. Air basins located within California also receive similar designations with respect to the CAAQSs.

In addition to the NAAQSs, the CAA requires the USEPA to place each airshed within the United States into one (1) of three (3) classes, which are designed to limit the deterioration of air quality when it is below the NAAQSs. Class I is the most restrictive air quality category, and was created by Congress to prevent further deterioration of air quality in national parks and wilderness areas of a given size which were in existence prior to 1977 or have since been designated under federal regulations (40 CFR 52.21). All remaining areas outside of the Class I area boundaries were designated as Class II airsheds, which allows a relatively greater deterioration of air quality over that in existence in 1977, although still below NAAQSs. No Class III areas, which would allow air quality to degrade down to the NAAQSs, have been designated.

Federal Prevention of Significant Deterioration (PSD) regulations require that the maximum allowable increase in ambient particulate matter in a Class I airshed resulting from a major stationary source is 5 $\mu g/m^3$ (annual geometric mean) and 10 $\mu g/m^3$ (24-hour average). Specific types of facilities which emit, or have the potential to emit, 100 tons per year or more of PM_{10}, or any facility which emits, or has the potential to emit, 250 tons per year or more of PM_{10}, is considered a major stationary source. However, most fugitive emissions are not counted as part of the calculation of emissions for PSD.

There are no designated Class I airsheds within 100 kilometers of the Project mine and process area; the nearest Class I airshed is the Joshua Tree National Park Class I airshed, which is located approximately 110 kilometers northeast of the Project mine and process area at its closest point (USEPA 1997). Neither of the two (2) wilderness areas recently established in the vicinity of the Project mine and process area were designated a Class I airsheds.

3.4.2. Meteorological Setting

The Project area is a desert environment characterized by very hot summers and mild winters. Humidity in the area is very low, with the exception being July and August, when humid winds may blow in from the Gulf of California, located southeast of the Project area (BLM and ICPBD 1994a). Precipitation in the area is low, with the average annual rainfall measured at the neighboring Gold Rock Ranch being only approximately 3.60 inches per year (GSi/Water 1993).

Two (2) general wind patterns exist in the region (BLM and ICPBD 1994a). From October to May, the prevailing winds are out of the west and northwest, and it is during these periods that humidity is at its lowest. Summer wind patterns, especially during July and August, are dominated by heat-induced low-pressure areas formed over the California desert, which draw air from the Gulf of California and the northern portion of Mexico. During these conditions, humidity is at its highest. The months of June and September are transitional months. Wind speeds in the region tend to be moderate, ranging from 5 to 8 mph at night (weakest in the late spring and strongest in the winter) to daytime winds averaging between 9 and 13 mph (strongest in the winter and early spring, weakest in the fall). These wind speeds tend to promote mixing, and generally transport locally generated air emissions away from the area (BLM and ICPBD 1994a).

3.4.3. Air Quality

The Project area is located within the Imperial County portion of the newly designated Salton Sea Air Basin (SSAB) (formerly the southern section of the Southeast Desert Air Basin (SEDAB)). The Imperial County portion of the SSAB is entirely under the jurisdiction of the Imperial County Air Pollution Control District (ICAPCD). That portion of Imperial County west of the crest of the Chocolate Mountains, which includes the Project area, is designated as "moderate non-attainment" under the NAAQS, and "non-attainment" under the CAAQS, for particulate matter less than 10 microns in diameter (PM_{10}). Imperial County is being re-evaluated for designation under the NAAQS for ozone (O_3), and is currently designated "moderate non-attainment/Transitional" for O_3. In addition, all of Imperial County is designated "non-attainment" under the CAAQS for ozone (O_3), and is designated as "attainment" for sulfates/sulfur dioxide (SO_4/SO_2), oxides of nitrogen (NO_x), and lead (Pb). A small portion of Imperial County (the city of Calexico) is classified as "non-attainment" for carbon monoxide (CO); the remainder of the County, including the portion in which the Project area is located, is designated "unclassified/attainment" under the NAAQS and CAAQS for CO. Imperial County is also designated as "unclassified" relative to the CAAQS for hydrogen sulfide (H_2S).

The ICAPCD-run stations for monitoring atmospheric pollutants located in California nearest the Project area are in El Centro and Brawley, California, approximately 46 miles west-southwest and 42 miles west, respectively, of the Project mine and process area. Both O_3 and PM_{10} are measured at the El Centro station, whereas only PM_{10} is measured at the Brawley station. Since 1985, four (4) PM_{10} monitoring stations have been operated by the operators of the Mesquite Mine, located approximately ten (10) miles northwest of the Project mine and process area. These four (4) stations are located within, or immediately adjacent to, the Mesquite Mine boundary. In addition, through 1996, two (2) PM_{10} monitoring stations were operated by the operators of the American Girl Mine; one (1) at the mine, located about seven (7) miles south of the Project mine and process area, and one (1) at Gold Rock Ranch, located approximately seven (7) miles southwest of the Project mine and process area.

During the 1988-1993 period, daily averages for PM_{10} measured at Brawley exceeded the CAAQS a total of 141 days (CARB 1989-1994). The highest number of exceedence days (35) in a single year was recorded in 1989, with 676 $\mu g/m^3$ being the highest recorded 24-hour PM_{10} concentration. Similarly, daily averages for PM_{10} measured at El Centro during the same period exceeded the CAAQS a total of 122 days. The highest number of exceedence days (31) in a single year was also recorded in 1989, with 287 $\mu g/m^3$ being the highest recorded 24-hour PM_{10} concentration (BLM and ICPBD 1994a). PM_{10} monitoring at the Mesquite Mine during 1991 indicated that the 24-hour CAAQS for PM_{10} was likely exceeded a total of 27 days that year (BLM and ICPBD 1994a). The NAAQS was never exceeded at the Mesquite Mine during that year, although measurements taken at Brawley and El Centro did exceed the NAAQS (BLM and ICPBD 1994a). Background (annual) PM_{10} levels calculated from the PM_{10} measured at the Mesquite Mine during 1991 and 1992 are reported as 19.9 $\mu g/m^3$ (arithmetic mean) and 18.1 $\mu g/m^3$ (geometric mean) (BLM and ICPBD

1994a). Background (annual) PM_{10} levels calculated from the PM_{10} measured at Gold Rock Ranch by the American Girl Mine for the year 1996 were 19.0 $\mu g/m^3$ (arithmetic mean) and 17.5 $\mu g/m^3$ (geometric mean). No data are currently available regarding the existing ambient PM_{10} concentrations in or immediately adjacent to the Project mine and process area.

Sources of PM_{10} in Imperial County are both natural and anthropogenic (that is, related to the activities of man). The primary source of PM_{10} and the related pollutant, total suspended particulates (TSP), in Imperial County is fugitive dust from area sources, principally vehicular traffic on unpaved roads and wind erosion of cultivated agricultural land, although PM_{10} and TSP transported into the Imperial Valley from Mexico are also substantial (Pechan & Associates 1993). PM_{10} can also be created indirectly in the atmosphere from chemical reactions that convert gaseous precursors into small particles. These PM_{10} precursors, which are predominantly products of man-made combustion, include NO_x, reactive organic gases (ROGs), and oxides of sulfur (SO_x). Principal existing PM_{10}/TSP sources in the vicinity of the Project area are wind erosion from disturbed areas, vehicular traffic on unpaved roads, and fugitive and point source emissions from other mining operations in the area.

Ozone (O_3) is a photochemical oxidant which is not typically emitted directly into the atmosphere, but is formed in the atmosphere through chemical reactions among emission precursors and ultraviolet light. Imperial County is classified as "transitional/attainment" by the USEPA for O_3 since recent ambient air monitoring for O_3 at the El Centro station has not indicated any exceedences of the NAAQS for O_3. However, between 1988 and 1993 there were a total of 45 exceedence days (139 hours) of the lower CAAQS for O_3 (CARB 1989-1994). The highest number of exceedence days (25) in a single year was recorded in 1993, with 150 ppbv being the highest recorded 24-hour O_3 concentration. A substantial portion of the O_3 measured in Imperial County is believed to be transported into the basin from other areas, principally from the South Coast Air Basin and Mexico, and these sources are likely the cause of at least some of the measured exceedences of the CAAQS for O_3 (BLM and ICPBD 1994a).

Hydrocarbons, or more specifically ROGs (also known as reactive organic compounds (ROCs)), are not strictly criteria air pollutants, but are recognized as precursors of photochemical oxidants, including O_3, and are also precursors to atmospheric particulate matter, both of which are criteria air pollutants. In addition, oxides of nitrogen (NO_x) and oxides of sulfur (SO_x), some forms of which are criteria pollutants, are also precursors to photochemical oxidants and atmospheric particulate matter. Table 3.8 presents a list of the criteria pollutants which can be created by secondary reactions from emissions of the precursors ROGs (ROCs), NO_x, and SO_x.

Table 3.8: Secondary Criteria Pollutants from Emissions of ROG, NO_x, and SO_x.

Precursor	Secondary (Criteria) Pollutants
Reactive Organic Gases (ROGs)	a) photochemical oxidants (ozone)
	b) the organic fraction of suspended particulate matter
Oxides of Nitrogen (NO_x)	a) nitrogen dioxide (NO_2)
	b) the nitrate fraction of suspended particulate matter
	c) photochemical oxidants (ozone)
Oxides of Sulfur (SO_x)	a) sulfur dioxide (SO_2)
	b) sulfate (SO_4)
	c) the sulfate fraction of suspended particulate matter

Source: South Coast Air Quality Management District 1994.

Principal sources of ROGs in the atmosphere include vehicular and industrial emissions and unsaturated hydrocarbon emissions from trees and other vegetation. No data are currently available regarding the levels of hydrocarbons in the ambient air in the Project area or immediate vicinity, but they are presumed to be negligible due to the lack of substantial emissions sources, including nearby existing mining operations (which typically have few sources of ROGs except for internal combustion engines). Similarly, no data are available regarding existing levels of sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) in the ambient air in the immediate Project area, although the levels of these pollutants are also presumed to be small because of the absence of local sources.

3.5. Biological Resources

3.5.1. Regulatory Framework

3.5.1.1. Federal Endangered Species Protection

The federal Endangered Species Act of 1973, as amended (ESA), provides the general regulatory framework for the protection of threatened or endangered (T/E) plant and animal species and critical habitat which are formally listed under the ESA. The ESA defines the following terms:

- <u>Endangered species</u>: "... any species which is in danger of extinction throughout all or a significant portion of its range ..."

- <u>Threatened species</u>: "... any species which is likely to become an endangered species within the foreseeable future..."

- Critical habitat: "... the specific areas within the geographical area occupied by the species ... on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection ..."

The ESA is administered by the U.S. Fish and Wildlife Service (USFWS), in consultation with other federal agencies (see Section 3.5.2).

In addition to listed T/E species, the USFWS identifies another group of species known as special status species (formerly "candidate species"). Special status species are not specifically afforded the same protection under the ESA as T/E species, but federal agencies are required to consider special status species in their planning and decision-making processes. The BLM evaluates special status species in a manner analogous to T/E species, and the BLM is required to deny approval of any project that may lead to the listing of special status species.

3.5.1.2. California Endangered Species Protection

The California Endangered Species Act of 1984 (CESA) and the California Native Plant Protection Act of 1977 (CNPPA) provide the framework for protection of California listed rare or endangered plant or animal species. The state also affords protection to candidate species which have been accepted for state review for potential listing as rare, threatened or endangered species. CESA status definitions include:

- Endangered: A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change of habitat, overexploitation, predation, competition, or disease.

- Threatened: A native species or subspecies of a bird, mammal, fish, amphibian, reptile or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter (California Fish and Game Code Chapter 1.5).

- Rare: A species, subspecies or variety is rare when, although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens.

- Candidate: A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the California Fish and Game Commission has formally noticed as being under review by the California Department of Fish and Game (CDFG) for addition to either the list of endangered species or the list of threatened species, or a species for which the California Fish and Game Commission has published a notice of proposed regulation to add the species to either list.

- Species of Special Concern: Native species or subspecies that have become vulnerable to extinction because of declining population levels, limited ranges, or rarity. The goal is to prevent these species from becoming endangered by addressing the issues of concern early enough to secure long term viability for these species.

The CEQA process requires state lead agencies to consult with the CDFG if proposed projects would adversely impact T/E species or their critical habitat (see Section 3.5.3).

3.5.1.3. BLM Sensitive Species

Plant and animal species are listed by the BLM as sensitive species if the species has been identified as a proposed T/E species or a special status species by the USFWS, or if the species has been designated as sensitive by the BLM State Director from information obtained from the California Native Plant Society (CNPS), California Natural Diversity Data Base (CNDDB), or other authoritative sources. The purpose of this listing is to provide increased management attention to species which may subsequently be listed as a federal or state T/E species as a result of declining populations or habitat.

3.5.1.4. California Native Plant Society

The CNPS is a professional society of plant biologists, scientists, and associated professionals which has accumulated a statewide data base on California native plants and their distribution. The CNPS has created four categorical listings of plants to identify their respective concern for these species as potential rare, threatened, or endangered species. These listings do not afford legal status or protection for the species, but the lists are utilized by agencies in their planning processes for activities which may impact the species or habitat. The listing categories include:

- CNPS 1A: Plant species presumed to be extinct in California.

- CNPS 1B: Plant species presumed to be rare, threatened, or endangered in California or elsewhere.

- CNPS 2: Plant species presumed to be rare, threatened, or endangered in California but common elsewhere.

- CNPS 3: Plant species for which more information is needed to be properly categorized, and includes an assemblage of taxa that have been transferred from other lists or have been suggested to CNPS for consideration.

- CNPS 4: Plant species which are not currently threatened or vulnerable but are considered to have limited distribution in California and, because of their uncommon status, should be monitored.

3.5.1.5. California Natural Diversity Data Base

The CNDDB is a computerized inventory of information on the general location and condition of California's rare and threatened animals, plants, and natural communities maintained by the CDFG. The species inventoried by the CNDDB are listed (both state and federal) endangered, threatened, and rare animals and plants. The CNDDB also includes species that the scientific community considers deserving of official listing. Sensitive species proposed for federal listing, USFWS special status species (formerly candidate species), and state candidate species are also identified by the CNDDB. The CNDDB includes information for reported sightings only, and it may not cover every project location. Therefore, site-specific biological surveys are typically also required.

3.5.1.6. Migratory Bird Treaty Act

Provisions of the Migratory Bird Treaty Act (16 USC 701-718h) are applicable to birds within the Project area. The Act establishes a comprehensive federal regulatory system governing the taking of all migratory birds, but makes no provisions for the killing of any migratory birds by mining operations or cyanide heap leaching processes. Activities which repeatedly or negligently fail to prevent migratory bird mortality could be prosecuted under the Act. Nearly all birds found within the Project area are considered migratory under the Act. Raptors and many other birds are protected from hunting under the Act.

3.5.1.7. Bald Eagle Protection Act

Amendments to the Bald Eagle Protection Act (PL 92-535) provide additional federal protection to the golden eagle. The golden eagle (*Aquila chrysaetos*) is not listed under the federal ESA as a threatened or endangered species, but the golden eagle is a fully protected species in California as a look-alike species.

3.5.1.8. Protection of Wetlands

Executive Order 11990 (Protection of Wetlands), effective May 24, 1977, is an overall wetlands policy for all agencies managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. This executive order requires federal agencies to follow avoidance/mitigation/preservation procedures, with public input, before proposing new construction in wetlands. When federal lands are proposed for lease to non-federal parties, the executive order requires that restrictions be placed in the lease to protect and enhance the wetlands on the property.

3.5.2. U.S. Fish and Wildlife Service Consultation

The ESA requires that the USFWS be formally consulted by federal agencies for those actions proposed by the federal agency which may adversely affect listed T/E species or their critical habitats. Protection under the ESA also extends to species and habitat proposed for listing, and the

BLM extends protective status to species and habitat identified by the USFWS as candidates for listing. The ESA prohibits the "take" (i.e., killing, harming, or harassment) of listed T/E species without special exemptions. Section 7(a) of the ESA requires that federal agencies responsible for authorizing projects (authorizing agencies) which may adversely affect a listed species, or may adversely modify listed critical habitat designated for such a species, undertake consultation with the USFWS. As discussed below, consultation may be informal or formal.

Informal consultation is a process that includes all discussions and correspondence between the authorizing agency and USFWS and is designed to determine if formal consultation is required. Unless it is readily apparent that formal consultation is necessary, the authorizing agency would typically first consult informally on all actions that may affect a listed species or its listed critical habitat. The authorizing agency would also typically seek recommendations for modification of actions that would avoid the likelihood of adverse effects and contribute to achieving recovery objectives for the listed species or its critical habitat.

Formal consultation is initiated by the authorizing agency through the preparation, and submittal to the USFWS, of a Biological Assessment prepared by the authorizing agency for the "proposed action." This Biological Assessment would be utilized in association with other informational resources by the USFWS to prepare the Biological Opinion. The Biological Opinion would determine if the "proposed action" is likely to jeopardize the continued existence of a listed species. A section of the Biological Opinion would specify the terms and conditions under which the listed species may be taken. This section also determines appropriate levels of take, as defined by individuals of the species killed, injured, or moved, and the amount of critical habitat subject to temporary and/or permanent disturbance. If the USFWS' Biological Opinion determines that the "proposed action" may jeopardize the continued existence of a listed species, then the authorizing agency must notify the USFWS in writing prior to its final decision on the "proposed action."

The consultation process is terminated by: the issuance of a biological opinion by the USFWS; notification by the authorizing agency that the "proposed action" is not likely to occur; or a determination by the authorizing agency (with the concurrence of the USFWS) that the "proposed action" is not likely to adversely affect any listed species.

3.5.3. California Department of Fish and Game Consultation

3.5.3.1. State Listed Species

The CESA also prohibits the "take" of any state listed species. If a state agency is acting as the CEQA lead agency, it is required to consult with the CDFG to determine if proposed projects are likely to jeopardize the continued existence of any T/E species or result in the destruction or adverse modification of habitat essential to the continued existence of any T/E species. However, if a local agency, such as the ICPBD, is the CEQA lead agency, such consultation is not required. The CDFG has instead historically authorized exceptions to the "take" prohibition to individuals which would

allow the "take" of state listed species for management purposes under Section 2081 of the California Fish and Game Code. This practice, although recently under judicial review, has now been reaffirmed with the passage and approval of SB 879, effective January 1, 1998. Where applicable, the Section 2081 process establishes measures for the protection of the affected T/E species and their habitat during project actions, and SB 879 adds that any required compensation must be roughly proportional to the impacts on the species. Where a species is both federal and state listed, and a project is subject to both NEPA and CEQA, the CDFG is encouraged to participate to the extent practical in the federal consultation process and adopt a coordinated biological opinion with the USFWS that reflects consistent and compatible findings between state and federal agencies. With the passage and approval of AB 21, effective January 1, 1998, the federal ESA Section 7 "take" authorization for a project would preclude the necessity for a state Section 2081 permit, if the Section 7 authorization is approved by CDFG as consistent with CESA.

Fourteen (14) animal and three (3) plant state-listed species have been identified by the CDFG within Imperial County (CDFG 1995). Project impacts on each of these species and their habitat must be considered by the CDFG under Section 2081.

3.5.3.2. Stream Alteration Agreement

Entities which propose to divert, obstruct or change the natural flow or the bed, channel or bank of any river, stream or lake in which there is at any time an existing fish or wildlife resource, must first notify the CDFG prior to the activity (California Fish and Game Code §1603). When an existing fish or wildlife resource may be "substantially adversely affected by the project or activity," the CDFG must respond to the notice by providing a description of the resource which would be affected and submitting a proposal for measures necessary to protect fish and wildlife. The affected entity is provided an opportunity to accept the CDFG proposal or through consultation reach a mutual agreement on measures necessary to protect fish and wildlife (i.e., Stream Alteration Agreement). If no agreement can be reached, then a panel of arbitrators is established with the power to settle disagreements and make binding decisions regarding fish and wildlife modifications. The project or activity may not proceed unless it is conducted in conformance with a Stream Alteration Agreement or the decisions of the panel of arbitrators.

The CDFG has stated that a Stream Alteration Agreement is required to conduct Project activities within the ephemeral drainage channels within the Project mine and process area. Of concern are the effects of the Project on the wildlife and the wash habitat.

3.5.4. Biological Setting

3.5.4.1. Project Location

The area of the Proposed Action is located in an Eastern Colorado Desert environment in southeastern Imperial County. The Project mine and process area is located on a broad south and west facing alluvial plain southwest of Indian Pass, between the Cargo Muchacho Mountains (located approximately four (4) miles south) and Black Mountain (located approximately five (5) miles north). The elevation over the Project mine and process area ranges from about 760 feet to 925 feet AMSL with the lower, and nearly flat, elevations in the south and southwest. Elevations gradually increase to the north and northeast with topography characterized by a series of gently rolling ridges separated by interconnecting drainages generally trending from northeast to southwest.

Soils within the Project mine and process area are dominated by desert pavement in the upland areas with gravel-based alluvial soil in the major drainages and the west-central portion of the Project mine and process area (see Section 3.2). Soils of the upland landscape support very little vegetation. A soil resource evaluation of the Project mine and process area was conducted by Bamberg and Hanne (1995a) and is provided as Attachment D to Appendix A of this report.

There are no springs, seeps, permanently wet areas, wetlands, nor standing surface water within the Project area. Three (3) primary, sub-parallel, ephemeral, stream channels traverse the Project mine and process area (see Section 3.3.1). The largest ephemeral stream channel is located near the western boundary of the Project mine and process area (the West Pit West channel) and parallels Indian Pass Road (see Section 3.3.1.1 and Figure 3.6). Two (2) branches of a second ephemeral channel (the West Pit East and East Pit West channels) enter the north-central portion of the Project mine and process area, merge, and exit the south-central portion of the Project mine and process area as a single ephemeral stream channel. The third ephemeral steam channel (East Pit East channel) is located in the east portion of the Project mine and process area. Precipitation in the Colorado Desert tends to occur in short, intense events and average annual precipitation in the Project area is only approximately 3.6 inches (see Section 3.4.2). The infrequent rain events result in temporary flow in the channels across the Project area which quickly infiltrates in the sandy and gravelly wash bottoms, providing some residual moisture to the wash vegetation between storm events.

Fluvial processes in the washes affect the rate of deposition and type of material deposited on the wash bottoms. Fluvial processes also affect nutrient cycling and biogeochemical processes in soils and water. These processes affect the vegetation and plant communities which can establish in the washes. As discussed in Section 3.3.1.2, the principal throughgoing stream channels appear to be currently "in balance;" that is, the reaches of the principal washes within the Project mine and process area are not dominated by either erosion or deposition, but both processes are occurring at approximately the same rate. The majority of the Project area has been subject to very slow erosional deflation by wind, which has produced a well-developed desert pavement. Wash bottoms have a veneer of recently deposited gravelly rock with sand and gravel along the banks. This erosional

material moves through the Project mine and process area by the flushing action of water flow following infrequent storm events (Bamberg and Hanne 1995a).

Surface runoff from this region, which comprises a portion of the Chocolate Mountains basin area, and includes the Project area, drains into individual isolated areas along the eastern edge of the Algodones Sand Dunes, providing moisture to pockets of microphyll vegetation (see Figure 3.5).

3.5.4.2. Special Biological Resource Management Areas

The Project area is located within the BLM's California Desert Conservation Area (CDCA) and is subject to the applicable plans and goals of the CDCA Plan. The CDCA Plan (1980) indicates that a prescriptive Habitat Management Plan (HMP) would be prepared by the BLM for the Indian Wash area, which includes the Project area. The long-term goals for the Indian Wash HMP stated in the CDCA Plan were to protect, stabilize, and/or enhance wildlife resource values in the area. The Indian Wash HMP would set forth management actions to meet these goals, including: control of vehicle use; restriction of camping and parking; and increasing surveillance in the area. The BLM has not yet prepared or implemented the Indian Wash HMP (Personal Communication, Nancy Nicolai, BLM, July 1, 1996).

Two (2) wilderness areas, Indian Pass Wilderness Area and Picacho Peak Wilderness Area, are located within one and one-half (1½) and one-half (½) miles of the Project mine and process area, respectively (see Figure 3.14). While not specifically developed as biological resource management areas, substantial protection to plants and animals within these areas is afforded by their designation as wilderness.

The USFWS has designated specific areas as desert tortoise critical habitat in an effort to manage the recovery of this species. The nearest desert tortoise critical habitat to the Project area is the Chuckwalla Unit, located at its closest approximately two (2) miles northwest of the Project mine and process area (see Figure 3.14).

3.5.5. Vegetation

Vegetation within the Project area is characterized by: tree/shrub vegetation in and adjacent to the ephemeral stream channels; and shrub/scrub vegetation on the upland areas between the stream channels (Bamberg and Hanne 1995b). Vegetation associations within the Project area are shown on Figure 3.15. All of the vegetation is highly adapted to be able to succeed in the harsh environment.

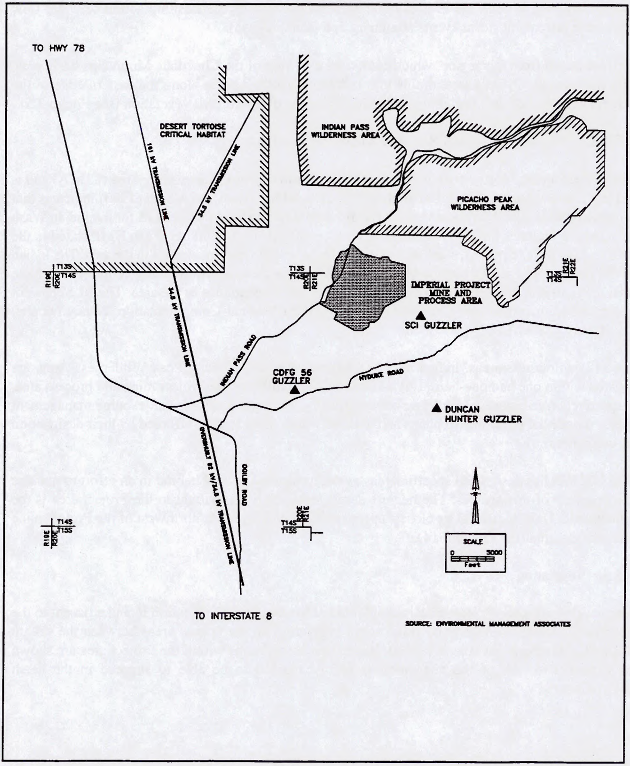

Figure 3.14: Special Biological Resource Management Areas Located in the Vicinity of the Project Area

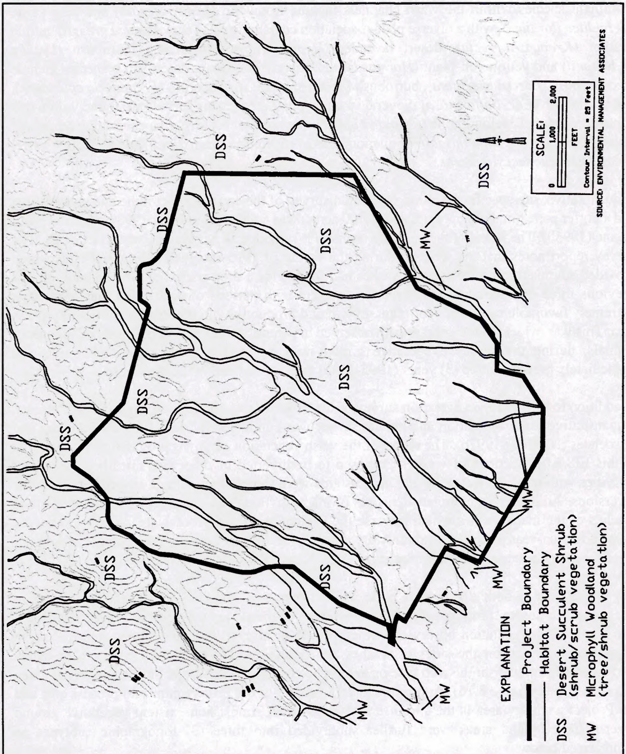

Figure 3.15: Vegetation and Habitat Associations Within the Imperial Project Mine and Process Area

Dominant species within the wash channels include ironwood (*Olneya tesota*) and palo verde (*Cercidium floridum*), with a diverse plant association containing cat's-claw (*Acacia greggii*), purple heather (*Krameria erecta*), desert lavender (*Hyptis emoryi*), Anderson thornbush (*Lycium andersonii*) and yellow felt-plant (*Horsfordia newberryi*). Dominant desert scrub species include creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), ocotillo (*Foaquieria splendens*), and brittlebush (*Encelia farinosa*). Several sparsely populated cactus species are found within this habitat, including Bigelow cholla (*Opuntia bigelovii*), cottontop cactus (*Echinocactus polycephalus*), beavertail cactus (*Opuntia basalaris*), diamond cactus (*Opuntia ramosissima*), and California barrel cactus (*Ferocactus cylindiceus*).

A quantitative, site-specific, baseline vegetation survey of the entire Project mine and process area and a buffer zone (total of approximately 1,700 acres) was conducted in June, 1995 by Bamberg and Hanne (1995b). The report of the vegetation survey is provided as Appendix F to this EIS/EIR. The survey report notes that the weather during the spring of 1995 included substantial rains which provided abundant moisture and the washes had flowed for a short period of time. In addition, the previous three (3) years had also been a wet cycle with periods of heavy rain that resulted in extremely favorable conditions for plant growth and productivity in the Project mine and process area. This was evident in the good growth observed in perennial trees and shrubs, and by herbaceous annuals, during the survey. Vegetative growth was reported to have been higher over the immediately previous three (3) years (1993-1995) than it had been in the previous 15-20 years.

In addition to the baseline vegetation survey of the Project mine and process area and buffer zone, a quantitative wash vegetation and habitat survey was conducted in May, 1997 by Bamberg and Associates (Bamberg 1997b). The report of the wash vegetation survey is provided as Appendix G to this EIS/EIR. Sections of washes proposed to be diverted or otherwise disturbed by Project activities within the Project mine and process area were sampled up- and down-gradient from the diversions. Additionally, complete censuses of microphyllous tree species were conducted along reaches of the main washes which traverse the Project mine and process area. The wash survey followed a two-year period of extremely dry weather conditions. Less than 0.25 inches of rain fell since the baseline survey was completed in 1995 (22 months).

Vegetation within both the Project mine and process area and the Project ancillary area are categorically creosote shrub type, but for the purposes of the survey the vegetation was subdivided into shrub/scrub vegetation observed on the open, drier alluvial flats and slopes; and tree/shrub vegetation observed on the sides of washes and drainages. The tree/shrub type can be easily distinguished from the shrub/scrub type on aerial photographs of the Project mine and process area and vicinity (see Figure 3.16). Approximately 95 percent of the Project mine and process area and the Project ancillary area is the shrub/scrub type with an almost non-existent vegetative ground cover. These upland areas were further subdivided into three (3) topographic subtypes as summarized below:

- Desert pavement: Covers an estimated 35 percent of the uplands; vegetation is extremely scarce; water and seeds cannot generally penetrate the surface; estimated vegetative ground cover at the time of the 1995 survey ranged from 0 to 0.5 percent.

- Alluvial flats and slopes: Covers an estimated 64 percent of the uplands; characterized as areas within the desert pavement that have had their alluvial surfaces disturbed in the last 1,000 years by erosion or deposition; spacing of plants by clumping in favorable areas; vegetative ground cover estimated at the time of the 1995 survey ranged from 7 to 9 percent.

- Rock outcrop/thin soil: Occurs in a small (1 percent) upland area in the north-central portion of the Project mine and process area; characterized by vegetation growing in cracks and between rocks; vegetation density is very low and clumped; vegetative ground cover estimated at the time of the 1995 survey was 2 to 4 percent.

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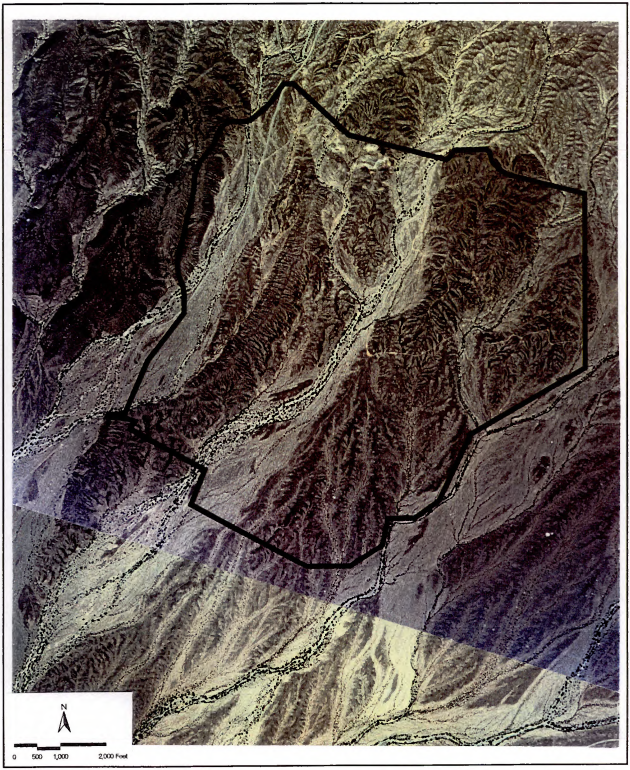

Figure 3.16: Composite Aerial Photograph Showing the Boundary of the Imperial Project Mine and Process Area

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The tree/shrub vegetation type occurs on the sides and banks of the washes, and represents a total of approximately five (5) percent of the Project mine and process area and the Project ancillary area. Two (2) topographic subtypes were identified as follows:

- Broad major washes: Drainages which cross the Project mine and process area and continue out onto the broad alluvial flats southwest of the Project area toward the Algodones Sand Dunes; characterized as washes ranging from almost no depth to fifteen (15) feet deep and eight (8) to 225 feet (average 40 feet) wide; plant cover at the time of the 1995 survey ranged from 0 percent in the sandy bottom areas to 66 percent on some sides and mid-wash clumps (islands).

- Shallow subsidiary washes: Narrower (average 30 feet) than the broad major washes and not as deep; finer soils washed or deposited within them; fewer and smaller trees with additional species present; plant cover at the time of the 1995 survey was irregular on the bottoms and the sides of these secondary drainages and averaged 35 to 45 percent.

The average cover measured in the baseline vegetation survey (Bamberg and Hanne 1995b) was seven (7) percent in the shrub/scrub community and 45 percent cover in the tree/shrub community. Diversity averaged seven and six-tenths (7.6) species per transect, indicating the low number of perennial species and wide spacing of individual plants. Average density of all plants in the shrub/scrub community was 136 plants per acre, and 1,058 plants per acre in the tree/shrub community. Because of the three (3) consecutive wet years and favorable conditions prior to the 1995 survey, the results of this vegetation survey were interpreted to represent the highest cover and diversity possible in the Project mine and process area, with more than four times (>4x) the cover which would be expected following a series of dry years.

The mean vegetative cover in the washes measured in the 1997 wash vegetation and habitat survey (Bamberg 1997b) ranged from 33 to 76 percent. Plant species diversity was measured at nine (9) to 16 perennial plant species per sample site. Perennial plants alone occurred in a range of densities from 36 to 580 individuals per acre.

During the vegetation surveys evidence of previous human disturbance within the Project mine and process area was observed, including roads and access trails and some previous trenching for exploration in the rock outcrop area. Plants had been periodically collected or cut; in particular, many of the older ironwood trees had been cut and were left as old stumps or resprouted bases on the sides of washes throughout the Project mine and process area.

Rado (1995) observed heavy prior cutting of ironwood trees in all of the washes in an area extending for at least one and one-half (1½) miles in each direction from the Project mine and process area. This was evidenced by old ironwood stumps and discarded branches. The reason for the heavy cutting of ironwood trees is believed to be historic harvesting for fuel, and it has probably resulted in the loss of many ironwood trees, reduced the tree canopy and degenerated the microphyll

woodland habitat in the area. Little regeneration of the ironwoods has occurred (Personal Communication, Ted Rado, February 9, 1996).

No perennial streams, riparian habitat, or wetland areas exist on or adjacent to the Project area (see Section 3.3.1 and Section 3.3.1.4). Further, no star dunes, sheet dunes, wind-accumulated sand deposits or other aeolian sand deposits exist within the Project area (Rado 1995).

3.5.5.1. Special Status Species

A total of 22 federal- or state-listed or proposed T/E plant species; USFWS special status species (e.g., former C2 or C3 candidate species); and BLM sensitive plant species were identified from lists which are known to occur in the general vicinity of the area of the Proposed Action (Rado 1997). These species are identified in Table 3.9. However, eleven (11) of these identified plant species do not have potential habitat within the area of the Proposed Action. These include: Pierson's milk-vetch (*Astragalus Magdalena* var. *Piersonii*), Algodones Dunes sunflower (*Helianthus nivens* ssp. *tephrodes*), giant Spanish needle (*Palafoxia arida* var. *gigantea*), Borrego milk-vetch (*Astragalus lentiginosus* var. *borreganus*), Hardwood's milk-vetch (*Astragulus insularis* var. *harwoodii*), Wiggins cholla (*Opuntia wigginsii*), sand food (*Pholisma sonorae*), and Wiggin's croton (*Croton wigginsii*), all of which are typically found in sand dunes; rock nettle (*Eucnida rupestris*), which is confined to an isolated occurrence in California located 60 miles west of the Project mine and process area; Glandular ditaxis (*Ditaxis clariana*), which is found only in Mojave scrub or Sonoran desert scrub/sandy soils not present in the area of the Proposed Action; and Munz's cholla (*Opuntia munzii*), which is found in lower fans and plains.

Table 3.9: Plant Species of Concern Known to Occur in the Vicinity of the Area of the Proposed Action

Common Name	Scientific Name	Status[a]
Pierson's milk-vetch	*Astragalus magdalena* var. *Piersonii*	BLM/FPE/SE/CNPS-1B[b]
Borrego milk-vetch	*Astragalus lentiginosus* var. *borreganus*	CNPS-4/SP[b]
Hardwood's milk-vetch	*Astagalus insularis* var. *hardwoodii*	CNPS-2[b]
Ribbed cryptantha	*Cryptantha costata*	CNPS-4/SP
Winged cryptantha	*Cryptantha holoptera*	CNPS-4/SP
Fairy duster	*Calliandra eriophylla*	CNPS-2/SP
Rock nettle	*Eucnida rupestris*	CNPS-2/SP[b]
California ditaxis	*Ditaxis California*	BLM/USFWS/CNPS-1B
Glandular ditaxis	*Ditaxis clariana*	CNPS-2[b]
Hairy stickleaf	*Mentzelia hirsutissima*	USFWS/CNPS-2/SP
Slender-lobed four o'clock	*Mirabilis tenuiloba*	CNPS-4/SP
Wiggin's cholla	*Opuntia wigginsii*	BLM/USFWS/CNPS-3/SP[b]
Sand food	*Pholisma sonorae*	BLM/CNPS-1B[b]
Foxtail cactus	*Escobaria vivipara* var. *alversonii*	BLM/USFWS/CNPS-1B/SP
Algodones Dunes sunflower	*Helianthus niveus* ssp. *tephrodes*	BLM/USFWS/SE/CNPS-1B/SP[b]
Munz's cholla	*Opuntia munzii*	BLM/USFWS/CNPS-1B/SP[b]
Giant spanish needle	*Palafoxia arida* var. *gigantea*	BLM/USFWS/CNPS-1B/SP[b]
Orocopia sage	*Salvia greatei*	BLM/USFWS/CNPS-1B/SP
Wiggin's croton	*Croton wigginsii*	BLM/USFWS/SR/CNPS-3/SP[b]
Desert unicorn plant	*Proboscidia althaefolia*	CNPS-4
Thurber's pilostyles	*Pilostyles thurberi*	CNPS-4
Crown-of-thorns	*Koebeslina spinosa*	CNPS-2

[a]Legend:

FPE: Federal proposed for endangered status
SE: California state listed as endangered
SR: California state rare species
CNPS: California Native Plant Society;
- 1B - Taxa determined to be rare, threatened or endangered;
- 2 - Species rare or endangered in California but common elsewhere;
- 3 - More information on status needed; and
- 4 - Species of limited distribution.

SP: California Special Plant
USFWS: Designated as a Special Status Species by the U.S. Fish and Wildlife Service
BLM: Designated a BLM Sensitive Species

[b]No potential habitats for species present within the area of the Proposed Action

Source: Rado 1997

The following plant species have geographic ranges and preferred habitats that indicate that they may potentially occur within or near the area of the Proposed Action. Descriptions of these species are provided below.

Foxtail cactus: Foxtail cactus is a small cactus associated with rocky alluvial slopes and hills. The distribution of the species ranges from approximately western Joshua Tree National Park southeast to the Chuckwalla Mountains of southeastern California (Munz 1974). In appearance, the foxtail cactus consists of one (1) to a few stems that branch from a common base to a height of about eight (8) inches. The identifying characteristic of this species are the elongated spines that are white at the base, but transitionally change color to red or purple near the tip, giving the plant an appearance like a fox's tail. Flowers are purple to magenta in coloration and bloom in May and June (Munz 1974; USBR 1996). The species is threatened by collecting (Skinner and Pavlik 1994).

Ribbed cryptantha: The ribbed cryptantha is a small annual in the Borage family characterized by ashen stems and leaves, with "ribbed" sepals (Jaeger 1941). Flowers are white, and bloom between April and May. It is uncommonly distributed in California on sandy soils and gravelly alluvial fans in the Colorado Desert between Palm Springs and Yuma below 1,500 feet in habitats dominated by creosote bush (Jaeger 1941; Munz 1974).

Winged cryptantha: The winged cryptantha is also a small annual in the Borage family, characterized by rough-hairy herbage, and a "completely winged" seed (Jaeger 1941). The species grows upright and may reach a height of about two (2) feet. White flowers bloom in March-April (Skinner and Pavlik 1994). It is irregularly distributed from the vicinity of Palm Springs to the Colorado River in California, present in gravelly and rocky habitats dominated by creosote bush below 2,000 feet (Munz 1974). The winged cryptantha is found in ephemeral stream channels and washes throughout the Colorado Desert, in the eastern Mojave Desert of California and Nevada, and in the Sonoran Desert of Arizona. The plants are not considered "rare" but are uncommon enough that CNPS recommends that their status be monitored. It has been previously recorded during area surveys for other projects in the area (Pritchett 1984; BLM and ICPBD 1995).

Fairy duster: Fairy duster is a low, rounded shrub with dark green acacia-like leaves. Flowers are scarlet and white, and bloom in January through March (Skinner and Pavlik 1994). It is closely associated with the edges of smaller washes in southeastern California desert regions (Jaeger 1941). It has been noted during botanical surveys of this general area (Environmental Solutions 1987; Office of Arid Lands Studies 1993).

California ditaxis: California ditaxis is a woody perennial herb, approximately eighteen (18) inches in height, associated with sandy washes and canyons distributed between the Santa Rosa Mountains and the southern side of the Eagle Mountains in Riverside County and San Diego County (Munz 1974; Skinner and Pavlik 1994). Distribution of plants appears to be spotty, with fewer than twenty (20) known occurrences, most consisting of few plants (Skinner and Pavlik 1994). Flowers are white in color. The California Desert Plan (BLM 1980) records a population of California ditaxis

near Picacho Peak, approximately ten (10) miles east of the Project mine and process area. This may represent an error, since the record is substantially southeast of the known geographic range (Munz 1974), and subsequent literature (CNPS 1988; Skinner and Pavlik 1994) do not address this locality. California ditaxis was not documented during surveys of the area of the Proposed Action (Rado 1997), nor in neighboring project sites (Office of Arid Lands Studies 1992; BLM 1994a). It is considered a "Special Status Species" by the USFWS and is a Category 1B taxon (i.e., plants rare, threatened or endangered in California and elsewhere) by the CNPS (Skinner and Pavlik 1994).

<u>Hairy stickleaf</u>: This is an annual blazing star, consisting of erect stems rising to ten (10) or more inches in height. The orange-colored flowers bloom in March-April. It is closely associated with coarse rock rubble and rocky slopes in creosote bush habitats below 2,000 feet. The geographic range in California is principally confined to Imperial County and eastern San Diego County. Localities include Box Canyon, Palm Canyon and Mountain Springs grade (Munz 1974). It has been previously recorded from this general area (CNPS 1988).

<u>Slender-lobed four o'clock</u>: Slender-lobed four o'clock is a perennial herb, with many branches extending from a base to a height of about 1.5 feet (Jaeger 1941). Flowers are white and bloom in March through May. The plant is closely associated with rocky slopes below 1,500 feet elevation in creosote bush habitats (Munz 1974). The geographic range extends from the western edge of the Colorado Desert south into Baja California (Jaeger 1941).

<u>Orocopia sage</u>: Orocopia sage is a sparsely-distributed spiny-leaved shrub associated with gravelly washes below 600 feet in elevation in the Orocopia Mountains and Chocolate Mountains areas of southeastern California (Jaeger 1941; Munz 1974). Its lavender flowers bloom in March to April.

<u>Desert unicorn plant</u>: Desert unicorn plant is a coarse spreading perennial species, associated with creosote bush scrub habitats in Imperial, San Diego and Riverside Counties in California. The geographic range of this taxon also includes portions of Sonora, Mexico; Baja California, Mexico; and the state of Arizona (CNPS 1988). Flowers are yellow to orange, with maroon streaking on the lower lobe and spotted along the sides of the "throat." It is uncommonly distributed throughout its range, and associated with sandy substrates (Munz 1974; Hickman 1993). It was not documented in the area of the Proposed Action during surveys (Rado 1997) and has not been recorded during surveys of the nearby Mesquite Mine (Office of Arid Lands Studies 1992) or American Girl Oro Cruz Project sites (BLM 1994a). Desert unicorn plant has no federal or state status. It is listed by the CNPS as a List 4 species (i.e., a "watch list" species).

<u>Thurber's pilostyles</u>: Thurber's pilostyles is a stem parasite associated with indigobush (*Dalea*, especially *Dalea emoryi*)(Munz 1974). Distribution of this plant in California is confined to creosote bush scrub habitats in Riverside, San Diego, and Imperial Counties in California. The geographic range of this plant also includes Arizona, Nevada, Texas, and Baja California (CNPS 1988; Hickman 1993). The plant, in appearance, is quite small, with scale-like leaves and flowers. Flowers are brown in coloration and minute in size (Munz 1974). The preferred host plant species, *Dalea emoryi*, was

not documented during surveys of the area of the Proposed Action (Rado 1997). Thurber's pilostyles has not been documented during surveys of the Mesquite Mine (Office of Arid Lands Studies 1992) or the American Girl Oro Cruz Project (BLM 1994a). Thurber's pilostyles has no federal or state status. It is listed by the CNPS as a List 4 species (i.e., a "watch list" species).

Crown-of-thorns: Crown-of-thorns is a nearly leafless deciduous shrub consisting of pale green, spine-tipped branchlets (Munz 1974). Flowers are small and greenish white in coloration. The species is present in washes in creosote bush scrub. It has been reported from the Chocolate Mountains in Imperial County (Munz 1974) east into parts of Sonora, Mexico; Arizona; and Texas (Munz 1974; Hickman 1993). In California it is known from fewer than ten (10) occurrences (Skinner and Pavlik 1994). Crown-of-thorns is highly visible and readily identified in areas where it occurs, but it was not documented during surveys of the area of the Proposed Action (Rado 1995), or during surveys of the Mesquite Mine area (Office of Arid Lands Studies 1992) or the American Girl Oro Cruz Project site (BLM 1994a). Crown-of-thorns has been listed by the CNPS as a List 2 taxon (i.e., plants rare, threatened, or endangered in California but more common elsewhere). It is not a federal- or state-listed species.

3.5.5.2. Botanical Survey Findings

Systematic pedestrian botanical surveys of the entire Project area, including the Project mine and process area, the Project ancillary area, and alternate transmission line corridors, including buffer zones, were conducted during multiple visits to the Project area in July, August, and September 1994 and in February, April, and May 1995 (Rado 1995). In addition, incidental observations of sensitive botanical species were made during the pedestrian biological survey of the overbuilt 92 kV/34.5 kV transmission line corridor in August and September of 1995 (Rado 1997; see Section 3.5.6.2). A total of 116 plant taxa were identified within the survey area. This includes a few introduced species of plants, mainly annuals such as mustards and grasses. Plants observed during the surveys were reported as typical of wash and desert scrub plant associations in the Colorado Desert (Rado 1995; Burk 1977). The botanical survey included collection of prior data from the area, California Native Plant Society (CNPS) data (Skinner and Pavlik 1994; CNPS 1988), and a review of prior biological survey reports conducted in the general area (Turner et al. 1980b; Pritchett 1984; Kiva Biological Consulting 1991; Office of Arid Lands Studies 1993; Environmental Solutions 1987; BLM undated; BLM 1994a). A detailed discussion of the findings and observations made during the botanical surveys is provided in the biological survey report (Rado 1995), which is attached as Appendix H.

The biological survey report indicates that no state or federal listed, proposed, or special status species were observed on the surveyed lands. No state or federal listed, proposed, or special status species have been reported to exist within the area of the Proposed Action (Rado 1997). A single sensitive plant species, the fairy duster, was observed within the Project mine and process area. The presence of fairy duster was common in virtually all of the ephemeral stream channels throughout the Project mine and process area. This species was restricted to the ephemeral stream channels, where it was generally present along wash edges and banks. It was most commonly observed in the

smaller channels; those between approximately two (2) and eight (8) feet in width. A total of 285 individual plants were observed, and the actual number present within the Project mine and process area probably exceeds 500 (Rado 1997).

One CNPS List 4 (i.e., "watch" list) species, winged cryptantha (*Cryptantha holoptera*), was found in larger stream channels throughout the Project mine and process area. A total of 53 individual plants were observed, and it was assumed that the actual number of plants was higher (Rado 1997). The plants were distributed along the edges of the larger washes within the Project mine and process area.

Foxtail cactus, ribbed cryptantha, California ditaxis, hairy stickleaf, slender-lobed four o'clock, orocopia sage, desert unicorn plant, Thurber's pilostyles, and crown-of-thorns were not documented during the biological surveys of the area of the Proposed Action (Rado 1995; Rado 1997).

3.5.6. Wildlife

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: document the results of a survey of the Project mine and process area for bats; document the results of a survey of the southernmost end of the overbuilt 92 kV/34.5 kV transmission line corridor for flat-tailed horned lizard or sign; and provide additional information on desert deer and bighorn sheep.

Wildlife found within the vicinity of the area of the Proposed Action are characteristic of the Eastern Colorado Desert (Rado 1995). Bamberg and Hanne (1995b) roughly estimated that 95 percent of the Project mine and process area is comprised of desert scrub habitat with predominantly scrub vegetation and relatively little succulent vegetation. The remaining estimated 5 percent of the Project mine and process area, restricted to the wash bottoms and adjacent areas, is comprised of tree/shrub vegetation, generally equivalent to microphyll woodland or desert dry wash woodland habitat. Independently, Rado (1995) utilized aerial photographs to map the two (2) major habitat associations (see Figure 3.14). Based upon the Rado map, approximately 139 acres of microphyll woodland habitat exists within the revised boundaries of the Project mine and process area (about 8.9 percent of the Project mine and process area). This estimate includes both vegetated areas along the banks and slopes of the drainages, and the less vegetated wash bottoms. Microphyll woodland is considered sensitive habitat by the CDFG.

Oblique aerial photographs taken in July, 1997 of the Project ancillary area and the overbuilt 92 kV/34.5 kV transmission line corridor were analyzed, together with the applicable USGS 7.5 minute series topographic maps, to estimate the microphyll woodland habitat within these areas. Approximately one-quarter (¼) mile of microphyll woodland habitat occurs within the alignment of the new transmission line/water pipeline within the Project ancillary area. Assuming disturbance occurs within a 60-foot wide corridor in the Project ancillary area, and providing a 20 percent methodology error, this translates to about 2 acres of microphyll woodland habitat which would be

disturbed (or about 5.8 percent of the total of 38 acres of disturbance) within the Project ancillary area. An estimated sixteen (16) of the overbuilt 92 kV/34.5 kV transmission line poles would be/are located in microphyll woodland habitat. Assuming an approximately 50-foot-square area of disturbance around each power line pole, and providing again a 20 percent methodology error, this translates to approximately 1 acre of microphyll woodland habitat which would be disturbed (or about 5 percent of the total 22 acres of disturbance) along the overbuilt 92 kV/34.5 kV transmission line corridor.

The following common species inhabit or occasionally visit the area of the Proposed Action:

Reptiles: zebra-tailed lizard (*Callisaurus draconoides*), side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), and desert iguana (*Dipsosaurus dorsalis*);

Birds: Using microphyll woodland habitat - mourning doves (*Zenaida macroura*), Gambels' quail (*Lophortyx gambelii*), Say's phoebes (*Sayornis saya*), and black-tailed gnatcatchers (*Polioptila melanura*);

Using desert succulent scrub habitat - black-throated sparrow (*Amphispiza bilineata*), loggerhead shrike (*Lanius ludovicianus*), and cactus wren (*Campylorhynchus brunnecapillus*);

Raptors: Multiple raptor species would be expected to periodically forage or migrate through the area, including: golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipiter striatus*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), northern harrier (*Circus cyaneus*), western screech-owl (*Otus kennicottii*), great horned owl (*Bubo virginianus*), and turkey vulture (*Cathartes aura*).

Mammals: antelope ground squirrel (*Ammospermophilus leucurus*), Merriam kangaroo rat (*Dipodomys merriami*), desert woodrat (*Neotoma lepida*), black-tailed jackrabbit (*Lepus californicus*), deer (*Odocoileus hemionus*), kit fox (*Vulpes macrotis*), coyote (*Canis latrans*), American badger (*Taxidea taxa*), and wild burro (*Equus asinus*).

3.5.6.1. Species of Concern

A total of 61 federal- or state-listed or proposed T/E wildlife species; USFWS special status species; BLM sensitive species; and/or California species of concern were identified from lists which are known to occur in the general vicinity of the area of the Proposed Action (Rado 1995; Rado 1997). These species are identified in Table 3.10. Twenty-nine (29) of these identified wildlife species do not have potential habitat within the area of the Proposed Action. For example, several sensitive species, including the Andrews' dune scarab beetle (*Pseudocotalpa andrewsi*) and Colorado Desert fringe-toed lizard (*Uma n. notata*), are closely associated with fine sand substrates not present in the area of the Proposed Action (Rado 1995; Rado 1997).

Table 3.10: Wildlife Species of Concern Known to Occur in the Vicinity of the Area of the Proposed Action

Wildlife Species of Concern Known to Occur in the Vicinity of the Area of the Proposed Action		
Common Name	**Scientific Name**	**Status[a]**
Alkali skipper	*Pseudocopaedes eunus eunus*	BLM/USFWS[b]
Cheeseweed owlfly	*Oliarces clara*	BLM/USFWS
Andrews' dune scarab beetle	*Pseudocotalpa andrewsi*	BLM/USFWS[b]
Brown-tassel trigonoscuta weevil	*Trigonoscuta brunnotasselata*	BLM/USFWS[b]
Desert pupfish	*Cyprinodon macularius*	BLM/FE/SE[b]
Razorback sucker	*Xyrauchen texanus*	BLM/FE/SE[b]
Flannelmouth sucker	*Catastomus latipinnis*	BLM/USFWS
Roundtail chub	*Gila robusta*	BLM/USFWS[b]
Colorado squawfish	*Ptychocheilus lucius*	FE/SE[b]
Arizona southwestern toad	*Bufo microscaphus microscaphus*	BLM/USFWS/CSC[b]
Yavapai leopard frog	*Rana yavapaiensis*	BLM/USFWS
Couches' spadefoot toad	*Scaphiopus couchi*	BLM/USFWS/CSC[b]
Desert tortoise	*Gopherus agassizii*	BLM/FT/ST
Flat-tailed horned lizard	*Phrynosoma mcallii*	BLM/CSC
Chuckwalla	*Sauromalus obesus*	BLM/USFWS
Colorado Desert fringe-toed lizard	*Uma notata notata*	BLM/USFWS/CSC[b]
Bald eagle	*Haliaeetus leucocephalus*	BLM/SE/FE[b]
Brown pelican	*Pelecanus occidentalis*	BLM/FT/ST[b]
Peregrine falcon	*Falco peregrinus*	BLM/USFWS/FE/SE
Yuma clapper rail	*Rallus longirostris yumanensis*	BLM/FE/SE[b]
Aleutian Canada goose	*Branta canadensis leucopareia*	BLM/FT/ST[b]
Southwestern willow flycatcher	*Empidonax traillii extimus*	BLM/FPE/SE[b]
Arizona Bell's vireo	*Vireo bellii arizonae*	BLM/SE[b]
Western yellow billed cuckoo	*Coccyzus americanus occidentalis*	SE[b]
California black rail	*Laterallus jamaicensis coturniculus*	BLM/USFWS/ST[b]
Black tern	*Coalitionist niger*	BLM/USFWS/CSC[b]
Burrowing owl	*Athene cunicularia*	BLM/USFWS/CSC
LeConte's thrasher	*Toxostoma LeConte*	CSC
Golden eagle	*Aquila chrysaetos*	CSC
Prairie falcon	*Falco mexicanus*	CSC
Ferruginous hawk	*Buteo regalis*	BLM/USFWS/CSC
Sharp-shinned hawk	*Accipiter striatus*	CSC
Northern harrier	*Circus cyaneus*	CSC
Cooper's hawk	*Accipiter cooperii*	CSC

Wildlife Species of Concern Known to Occur in the Vicinity of the Area of the Proposed Action		
Common Name	**Scientific Name**	**Status[a]**
Large-billed savannah sparrow	*Passerculus sanwichensis rostratus*	BLM/USFWS/CSC[b]
Loggerhead shrike	*Lanius ludovicianus*	BLM/USFWS/CSC
Black-tailed gnatcatcher	*Polioptila melanura*	CSC
Long-eared owl	*Asio otus*	CSC
Barn owl	*Tyto alba*	CSC
Elf owl	*Micrathene whitneyi*	SE[b]
Gila woodpecker	*Melanerpes uropygial is*	BLM/USFWS/SE
Mountain plover	*Charadrius montanus*	BLM/USFWS[b]
Western least bittern	*Ixobrychus exilis hesperus*	BLM/USFWS/CSC[b]
White-faced ibis	*Plegadis chichi*	BLM/USFWS/CSC[b]
Crissal thrasher	*Toxostoma dorsale*	CSC
Vaux's swift	*Chaetura vauxi*	CSC
Gilded northern flicker	*Colaptes auratus chrysoides*	SE[b]
California leaf-nosed bat	*Macrotus californicus*	BLM/USFWS/CSC
Greater western mastiff bat	*Eumops perotis californicus*	BLM/USFWS/CSC
Occult little brown bat	*Myotis lucifugus occultism*	BLM/USFWS/CSC
Spotted bat	*Euderma maculatum*	BLM/USFWS/CSC
Small-footed myotis	*Myotis ciliolabrum*	BLM/USFWS
Yuma myotis	*Myotis yumanensis*	BLM/USFWS
Cave myotis	*Myotis velifer*	BLM/USFWS/CSC
Desert pallid bat	*Antrozous pallidus pallidus*	CSC
Townsend's big-eared bat	*Plecotus townsendii*	BLM/USFWS/CSC
Yuma hispid cotton rat	*Sigmodon hispidus eremicus*	BLM/USFWS/CSC[b]
White-throated woodrat	*Neotoma albigula venusta*	BLM/USFWS/CSC
Colorado River cotton rat	*Sigmodon arizonae plenus*	BLM/USFWS/CSC[b]
Yuma puma	*Felis concolor browni*	BLM/USFWS/CSC
American badger	*Taxidea taxus*	CSC

[a]Legend:

FE:	Federal listed as endangered
FPE:	Federal proposed for endangered status
FT:	Federal listed as threatened
FTE:	Federal proposed for threatened status
SE:	California state listed as endangered
ST:	California state listed as threatened
SP:	California Special Plant
BLM:	Designated a sensitive species by the U.S. Bureau of Land Management
USFWS:	Designated a special status species by the U.S. Fish and Wildlife Service
CSC:	California species of concern

[b]No potential habitats for species present within the area of the Proposed Action

Source: Rado 1995; Rado 1997

The following wildlife species have geographic ranges and preferred habitats that indicate that they may potentially occur on or near the area of the Proposed Action. Descriptions of the species, together with results of applicable historic surveys, are provided below.

Cheeseweed owlfly: The cheeseweed owlfly is closely related to lacewings, antlions, and fishflies in the insect order Neuroptera. It is approximately 1.5 inches in length and resembles a large winged termite. Eggs are laid and hatch in the soil. Larvae burrow into the soil and attach to roots of their host plant, creosote bush. Adults emerge from the soil between March and May, in aggregations that are short-lived, typically less than four (4) days in duration (Faulkner 1990). The emergence of adults for breeding does not follow a regular pattern, but is dependent upon preceding winters of high precipitation; during dry years no emergence may occur (Faulkner 1990).

The distribution of this species in the deserts of southeastern California, southern Nevada and western Arizona is not well understood. Widely dispersed locality records and the wide distribution of the host plant, creosote bush, suggest that the species is difficult to document due to its unpredictable and short-duration emergences as an adult (USBR 1996). Locality records are widely dispersed, and include the vicinity of Mecca (California), near Parker (Arizona), the Gila Mountains (Arizona), Boulder City (Nevada), Telegraph Pass (Arizona), Black Mountain (California), along the road between Rice and Blythe (California), and the vicinity of Palm Springs (California) (USBR 1996). There is no text in the literature identifying the species as rare and, given the huge range of locality records for its host plant, the species could actually be common, but because of its irregular emergence pattern it is difficult to observe. The species was originally listed as a Category 2 species (i.e., more information is needed), and it is currently considered a special status species by the USFWS and a sensitive species by the BLM (Personal Communication, Ted Rado, February 9, 1996).

Flat-tailed horned lizard: The flat-tailed horned lizard is a medium-sized horned lizard, approximately six (6) inches in total length, that ranges from southeastern California into extreme southwestern Arizona and Sonora, Mexico. Coloration is usually whitish, with a narrow dark stripe

extending down the center of the back. A series of six (6) elongated head scales, typical of the genus, are located at the base of the skull. The centermost of these head spines (called occipital horns) are unusually elongate and, together with the long flattened tail and center dark dorsal stripe, distinguish this horned lizard species from other members of the genus (Smith 1967).

The flat-tailed horned lizard is principally associated with sandy habitats, often interspersed with harder soils that support colonies of harvester ants, a primary food source for this lizard (CDFG 1991). The flat-tailed horned lizard is generally considered to be difficult to locate, and relatively rare throughout its geographic range (Norris 1949; Klauber 1939). Regional surveys to determine relative abundance and distribution have confirmed this scarcity (Turner et al 1980b; Turner et al 1978), and also suggest declines where prior researchers have documented relatively high abundance, such as at the Algodones Sand Dunes (Mayhew 1965).

In California, the geographic range of the flat-tailed horned lizard extends over approximately 2,700 square miles. A total of 330 square miles of this area, located on the East Mesa and in the Yuha Basin of central Imperial County, have been identified as optimal habitat for this species (Turner et al. 1980b; Rado no date). Repeat surveys on flat-tailed horned lizard optimal habitat on Bureau of Land Management lands at East Mesa and Yuha Basin have recorded declines in relative abundance in both areas (Olech no date). The documented scarcity of this species, threatened habitat, and documented declines in populations resulted in a proposal to list the flat-tailed horned lizard as a threatened species in 1993 (58 *Federal Register* 62624-62629). However, the proposed rule to list the species was subsequently withdrawn on July 15, 1997 (62 *Federal Register* 37852-37860).

Nearest locality records to the Project mine and process area are from the vicinity of Ogilby (Townships 15 and 16 South, Range 20 East), located approximately ten to twelve (10-12) miles south-southwest of the Project mine and process area along the eastern edge of the Algodones Sand Dunes (Bolster 1989). Turner et al. (1980a), completing a range-wide inventory of public lands administered by the BLM for the flat-tailed horned lizard, did not document the species within any Townships encompassing the Project area. Reasons for this apparent absence probably relate to substrate. The Project mine and process area and the Project ancillary area, as well as the overbuilt 92 kV/34.5 kV transmission line corridor, consist principally of desert pavement, coarse gravel, and compacted gravelly sands not commonly occupied by this species. Jennings and Hayes (1994), in a comprehensive overview for the California Department of Fish and Game, state that the flat-tailed horned lizard "...is a specialized sand-dweller that has not been observed outside of areas with a shifting sand substrate." Most records for flat-tailed horned lizards come from the creosote (*Larrea tridentata*) white bursage (*Ambrosia dumosa*) series of Sonoran desert scrub (Turner and Brown 1982). It is this open community in association with sandy flats and valleys that is often described as flat-tailed horned lizard habitat (Stebbins 1985; Turner and Medica 1982; Rorabaugh et al. 1987). Although most records for the species are from sandy flats or areas with a veneer of fine, windblown sand, the flat-tailed horned lizard has also been collected or observed in areas with little or no windblown sand, such as badlands in the Yuha Basin and the Borrego Valley, and on saltbush flats at the northeastern end of the Salton Sea (Turner et al. 1980). The species has also been recorded in

the mixed scrub series of Sonoran desert scrub (Turner and Brown 1982), on gravelly soils in Anza-Borrego Desert State Park, and in association with senita cactus (*Lophocereus schotti*) in Sonora, Mexico. Flat-tailed horned lizards are probably absent or rare in the unvegetated portions of major dune systems, such as the Algodones Sand Dunes and the dunes of the Gran Desierto (Luckenbach and Bury 1983; McCalvin 1993).

Chuckwalla: The chuckwalla is a large, robust, nonvenomous lizard species closely associated with rock outcrops and rock crevices in the Mojave, Colorado, and Sonoran deserts (Stebbins 1985). Total length in males may approach eighteen (18) inches. Overall body shape is flattened, with loose skin folds on the sides, and a large fleshy tail used to store fat. Scalation consists of many fine scales, giving the skin a sand-paper texture. Food consists of a variety of plants including the flowers of creosote bushes. Coloration is highly variable, and usually approximates that of the rock outcrops inhabited by a particular population. Typically the body is dark, with a lighter tail (Miller and Stebbins 1964; Stebbins 1985; Smith 1967).

Desert tortoise: The desert tortoise is widely distributed over portions of the Mojave, Sonoran, and Colorado deserts of the western United States and northwestern Mexico. Habitats occupied include plains and valleys in the Mojave Desert, bajadas and low mountain slopes in the Sonoran Desert, and thorn scrub forest in Mexico. Dominant vegetation includes creosote bush, burrobush, Joshua trees, ocotillo, palo verde, and several species of saltbush (Woodbury and Hardy 1948; Schwartzmann and Ohmart 1977; Berry 1975; Berry and Nicholson 1984). Critical habitat for the species has been identified by the USFWS, and the BLM has established Desert Wildlife Management Areas (DWMA's) as part of the Desert Tortoise (Mojave Population) Recovery Plan. The nearest desert tortoise critical habitat to the area of the Proposed Action is the Chuckwalla Unit, the southern end of which is located approximately two (2) miles northwest of the Project mine and process area (see Figure 3.15).

The desert tortoise is a highly adapted, adept digger. Burrows are constructed to avoid harsh temperatures and to avoid predators. Burrows used by tortoises include a shallow "pallet" that is used regularly during seasonal activity periods, and a deeper, more extensive burrow that is used during periods of inactivity (Woodbury and Hardy 1948; Berry 1975). Burrows may be constructed almost anywhere, including under boulders, canopies of shrubs, wash embankments, or in the open (Woodbury and Hardy 1948; Berry 1972; Burge and Bradley 1976; Coombs 1977).

The species is herbivorous. Tortoises eat a variety of annual flowers, perennial grasses, a few half shrubs, and flowers of perennial shrubs. Desert tortoises also rely heavily on intermittent rainfall to re-hydrate, and would emerge in numbers immediately following the onset of spring and summer rains to drink (Medica et al. 1982).

Desert tortoises are mature at approximately 15-20 years of age (Woodbury and Hardy 1948). One to two (1-2) clutches of 2-14 eggs are laid during the spring or early summer in or near the females

burrow (Miller 1955; Turner et al. 1987). Eggs hatch in about 105-135 days (Coombs 1977). Individual animals may live for over 100 years (Woodbury and Hardy 1948).

Desert tortoise populations have declined in recent years as a consequence of several factors. Man-induced activities, including urbanization, highway construction, livestock grazing, motorized recreation, utility and pipeline corridors, mineral exploration and development, and energy development, have contributed to habitat loss and degradation (Berry and Nicholson 1984). Populations have also suffered major declines as a result of disease outbreaks and excessive predation by ravens, a major predator of juvenile tortoises (BLM, et al. 1989).

American peregrine falcon: The American peregrine falcon is a large falcon, with narrow, pointed wings that extend to a total length of about 40 inches. Adults are bluish in coloration above and light-buff below. The head is very dark, with a "cap" that extends on both sides to well below the eyes. Peregrine falcons feed entirely on other birds that are caught in the air. The species suffered precipitous declines attributed principally to nest failure as a result of pesticide (e.g., DDT) effects (CDFG 1991; BioSystems 1991; USBR 1996).

Preferred habitat typically consists of cliff faces near optimal foraging habitat, usually close to rivers, lakes, or streams (USBR 1996). Surveys of the lower Colorado River system during 1990 did not document nesting activities south of Lake Mohave; however, potential peregrine falcon nesting habitat exists in a narrow series of steeply rising bluffs bordering the lower portion of the Colorado River in Topock Gorge and near Bill Williams delta (USBR 1996). The area of the Proposed Action does not lie within the identified breeding range of the American peregrine falcon (BioSystems 1991).

Golden eagle: The golden eagle favors mountainous and hilly terrain with open country for foraging. This large raptor can have a wingspan up to 6.5 feet and weigh as much as 14 pounds (BioSystems 1989). Adult birds are mainly dark brown, with immature birds showing some white plumage. All ages possess golden feathers on the head and shoulder region. This species feeds on a variety of mammals, snakes and other birds and carrion. Golden eagles nest in large trees, cliffs, escarpments and occasionally on transmission towers. Golden eagles are relatively rare in the Colorado Desert (Garrett and Dunn 1981).

Northern harrier: The northern harrier is distinguished by its owl-like facial disk and white rump patch. Males are generally gray above, white below with black wing tips, while females are brown above and white below with heavy brown streaking (National Geographic Society 1987). Harriers usually fly very close to the ground when foraging for prey such as amphibians, reptiles, small birds and mammals. This species is most common in the vicinity of wetlands and agricultural areas, but can be observed in sparsely vegetated areas and the desert while migrating. In the winter, this species can be observed along the Colorado River and in agricultural areas of the desert.

Miller and Stebbins (1964) record this species as an infrequent migrant in Joshua Tree National Park. Weathers (1983) also records it as a migrant in Deep Canyon, near Palm Springs. The species has also been reported from the Algodones Sand Dunes, about fifteen (15) miles west of the Project mine and process area, between the months of January and April (BLM records).

Ferruginous hawk: The ferruginous hawk derives its common name from its rust-colored back and shoulder regions that contrast sharply with its mainly white underparts. This is one of the largest hawks in the United States that favors open dry country. In southern California this species is a winter visitor, typically arriving in early fall and departing in early spring. Ferruginous hawks can be observed in the vicinity of grassland and agricultural areas in the desert, but they are rather rare and uncommon near the Colorado River (Garrett and Dunn 1981). Ferruginous hawks have been reported in the vicinity of the Coachella and All American Canals between the months of January and April (BLM records). This species is a California Species of Concern as a wintering bird in southern California.

Sharp-shinned hawk: The sharp-shinned hawk is a small raptor distinguished by its small size and square-tipped tail. Coloration on the back is charcoal to brownish, with a lighter colored breast mottled with reddish brown streaks or bars. The long tail is distinctly banded. It feeds on a variety of other birds, including juncos and warblers (Weathers 1983). Geographic range for this species is extensive, and includes most of California.

Within the Colorado and Mojave Desert, sharp-shinned hawks are uncommon winter residents. Miller and Stebbins (1964) note occurrences of this species at Joshua Tree National Park between October and February. Weathers (1983) has noted it as an "uncommon migrant" in Deep Canyon near Palm Springs. It has also been recorded from eight (8) miles east of Picacho (about twenty (20) miles east of the Project mine and process area)(BLM data).

Burrowing owl: The burrowing owl is an owl of sparsely vegetated habitats but also frequents golf courses, abandoned agricultural fields, road cuts and airports. Although nocturnal, it commonly perches conspicuously during daylight hours at the entrance to its burrow or on some low post. These small owls feed on insects, small birds, and mammals. Burrowing owls usually nest in single pairs or as small colonies, and utilize abandoned mammal burrows or rarely burrows that they construct for themselves for nesting and shelter. This species is common in the agricultural areas of Imperial Valley and near the Colorado River (BioSystems 1989).

Cooper's hawk: The Cooper's hawk is an uncommon bird often associated with open woodlands. It is slightly larger in size than a sharp-shinned hawk and similarly colored, with a strongly barred and rounded tail. Food consists of a variety of birds and small mammals (Weathers 1983). Weathers (1983) notes that Cooper's hawks are uncommon throughout the year in Deep Canyon, with numbers increasing during the winter months. Miller and Stebbins (1967) also record it as an uncommon winter visitor at Joshua Tree National Park, with park records between August and November. The

species has been recorded from January in the Algodones Sand Dunes, approximately twenty (20) miles southwest of the Project area (BLM records).

Long-eared owl: Long-eared owls are medium-sized owls, distinguished by long prominent feather "tufts." It is widely distributed across the Northern Hemisphere. The plumage is intricately patterned, with mottling of grey, black and white feathers dorsally and a series of brown and grey streaks and bars ventrally. Prey includes a variety of small nocturnal mammals. Miller and Stebbins (1964) record it as "rare" in Joshua Tree National Park. It has been reported from "Glamis Forest" in Township 13 South, Range 18 East, approximately twenty (20) miles west of the Project area (BLM data).

Prairie falcon: The prairie falcon is a large falcon, with a brownish dorsal coloration with a light breast stippled with brown and black. Wingspan is about 30 inches. Primary prey includes other birds, although small mammals may also be eaten. Nesting occurs typically on cliff edges, cliff faces, or in potholes on precipitous slopes, usually at a height of 30 or more feet above ground level. The range of this species in the California deserts is extensive, and includes virtually the entire Colorado Desert. It is intolerant of disturbance during nesting, and nests may be abandoned as a result of human intrusion (BioSystems 1989; Weathers 1983).

Barn owl: The barn owl is a medium-size owl with a widespread distribution across the northern hemisphere. Dorsal coloration is light brownish. Ventral coloration is off-white, with darker fine stippling. The face is distinctly "heart-shaped," with small dark eyes. Legs are distinct and long. Barn owls forage for mice from mine shafts and tunnels, natural caves and rock fissures, and abandoned buildings. Eggs are laid at approximately two (2)-day intervals, resulting in nests comprised of several young of differing size. Young fledge in about 60 days (Weathers 1983). The distribution within the California deserts is extensive. Barn owls have been reported from agriculturally developed areas around El Centro, and from creosote bush scrub habitats in the Algodones Sand Dunes area, approximately fifteen (15) miles west of the Project area (BLM data).

Loggerhead shrike: The loggerhead shrike is a species that can be found in both open or brushy country, from desert to coastal habitats. Loggerhead shrikes are strikingly marked grayish white and black birds with a conspicuous dark eye "mask." This bird is often observed perched on some form of "lookout" (e.g., tree limb, fence post, ocotillo, etc.), from which it would dive on prey. Prey, consisting of insects, reptiles and small mammals, is often impaled on some sharp object (e.g., thorns, barbed wire, etc.) and left for future consumption. The loggerhead shrike is found in shrub habitats throughout California.

Arizona Bell's vireo: The Arizona Bell's vireo is a subspecies of Bell's vireo with isolated willow-mesquite habitat in California in the vicinity of Needles and the Laguna Dam along the Colorado River (CDFG 1991). Plumage of this small species is grayish above and whitish below. The species is generally indistinct and hard to identify when not singing. Bell's vireo song is distinct among vireos. Prey consist of insects, spiders, and fruits. The subspecies is listed as endangered by

California due to loss of riparian habitat and the invasion of remaining habitat fragments by brown-headed cowbirds which parasitize this vireo's nests. A single Bell's vireo was observed in Tumco Wash, approximately ten (10) miles south of the Project mine and process area, during a biological survey in 1992 (Western Resource Development 1993).

Black-tailed gnatcatcher: The black-tailed gnatcatcher is blue-gray above, and grayish white below. The outer tail feathers are mostly black with some white markings below. A common resident of the Colorado Desert, it is found in the catclaw acacia-smoke tree vegetation of the southeastern deserts. Prey consists of a variety of insect species. This species is a common resident along the Colorado River, but it tends to avoid agricultural areas and tamarisk groves (Garrett and Dunn 1981). Its geographic range extends from southern Inyo County to the United States-Mexican border in the United States. The close association of this species with wash vegetation has been noted by Miller and Stebbins (1964) and by Weathers (1983).

LeConte's thrasher: LeConte's thrasher is a pale grayish-brown thrasher that is lighter in coloration than other thrasher species. Other distinguishing field marks include dark eyes, bill and tail. LeConte's thrashers prefer arid, sparsely vegetated habitats (e.g., desert washes and flats) in both the Mojave and Colorado Deserts of California. This bird is uncommon throughout most of its range. LeConte's thrasher is absent from the irrigated portions of the Imperial Valley and the Colorado River, but it breeds in drier habitats outside of these areas (Garrett and Dunn 1981).

LeConte's thrasher has been previously recorded from the general vicinity of the area of the Proposed Action (CNDDB records). Prior records include drainages in Sections 11 and 28 of Township 14 South, Range 20 East, located west of the Project area (BLM data).

Gila woodpecker: The Gila woodpecker is a large woodpecker with grayish-brown overall coloration. The back is barred with black and white. In flight, there is also a white patch on each wing, and the tail is barred with black and white. Principal food includes other bird eggs, vegetable and fruit material, and insects (CDFG 1991).

Gila woodpeckers are cavity nesters that prefer mature cottonwood and willow trees within riparian habitats. Although originally ranging along the lower Colorado River in California, the species is currently restricted to isolated disjunct occurrences between Needles and Yuma. Currently, about 200 individual birds are known to occur in this area (CDFG 1991). The Gila woodpecker has been listed as endangered by California as a result of habitat loss and degradation and from nest competition with the introduced European starling (*Sturnis vulgaris*). General area records include eight (8) miles east of Picacho (twenty (20) miles east of the Project mine and process area) and Blythe (35 miles northeast of the Project) (BLM data).

Crissal thrasher: The crissal thrasher is a medium-sized songbird, distinguished by its downward-curved bill and rusty-colored undertail. Overall coloration is brown. The species is closely associated with densely vegetated canyons and desert washes (Robbins 1996; Weathers

1983). The crissal thrasher has been previously recorded from Indian Wash, where an estimated three (3) breeding pairs were recorded during June 1977 (CNDDB records).

Vaux's swift: The Vaux's swift is a small streamlined bird adapted for highly maneuverable flight. Coloration is charcoal above and pale gray and white below. This species migrates extensively. Vaux's swifts breed from southeastern Alaska south to central California, and in southern Mexico south to Panama (Miller and Stebbins 1964). The nearest breeding areas to the Project area are in the Sierra Nevada of central California (Personal Communication, Peter Woodman, 1996). Vaux's swift appear in southern California as spring and fall migrants, typically flying alone or in small groups of up to as many as fifteen (15) individuals. Miller and Stebbins (1964) cite several records of small groups of migrating birds in Joshua Tree National Park during the months of April-May and again in September.

White-throated woodrat: The white-throated woodrat is a stocky-shaped medium-sized rodent, with a total length of about fifteen (15) inches. The body plan for this species is highly generalist. The tail, comprising about half of this length, is grayish above and white below. The belly is whitish. The dorsal coloration is grayish intermixed with dusky hairs. This subspecies is distinguished by all others by the throat region, where hairs are pure white to their roots (Ingles 1965). The geographic distribution of the subspecies *venasta* of the white-throated woodrat ranges roughly from southwestern and west-central Arizona west into extreme southeastern California, to the vicinity of Borrego Springs (Hall 1981). Associated habitats often include mesquite woodland (Ingles 1965) and large patches of beavertail cactus (Williams 1986). Large quantities of dead trees enhance woodrat populations by providing nest material and cover (Personal Communication, Nancy Nicolai, BLM, 1996). Local records include the vicinity of Glamis (fifteen (15) miles west of the Project area) and Pilot Knob (approximately three (3) miles southeast of the southern end of the overbuilt 92 kV/34.5 kV transmission line corridor).

Yuma puma: The Yuma puma is a narrowly-distributed light race of the mountain lion restricted to the lower Colorado River drainage. This is a large feline, with a total length of about six to eight (6-8) feet, including an approximately three (3)-foot long tail. General coloration on this race is very pale above and whitish below. Prey includes burro deer, rodents, and rabbits (Williams 1986). Grinnell (1933) noted that they were associated with dense "bottomland" vegetation along the Colorado River and nearby rocky uplands. Very little is known about the population status of this race and its ecology. Records proximate to the Project area include twelve (12) miles north of Yuma (1903 record), twenty (20) miles north of Picacho (no date), and sightings from the Imperial National Wildlife Refuge during the 1940's (Williams 1986). The Project area lies near the western edge of the historical range of the Yuma puma. A contract survey conducted for the USFWS in the 1980's to collect recent possible sightings of the Yuma puma did not result in any new records. There are unconfirmed reports of mountain lions in the Picacho State Recreation Area, principally reported to the CDFG by deerhunters (Personal Communication, Rusty McBride, CDFG, 1995). More recently, a critical review of the status of the Yuma puma was undertaken (McIvor, et al. 1994). Much confusion exists over the taxonomic status of the Yuma puma, as well as the viability of a population

of mountain lions along the Lower Colorado River. Based on available information, it was concluded that *Felis concolor brownii* does not deserve subspecific designation. Nevertheless, a population of mountain lions does exist along the Lower Colorado River, and the greatest threat to their survival appears to be loss of habitat, particularly riparian and wetland communities, as it relates to loss of prey species, especially deer herds.

<u>American badger</u>: The American badger is widely distributed across the west-central Canada, the western United States, and northern Mexico. Habitats occupied include deserts, plains, foothills, and mountain valleys. The badger is characterized as a short, stout predator, with powerful forelegs and claws for digging out its rodent prey. Coloration is brownish or grayish dorsally, with a striking black-and-wide striping across the face. The ears are small and tail short (Ingles 1965; Burt and Grossenheider 1964). Overall length is about 28 inches, and weight about twenty (20) pounds. Messick (1987) cited studies documenting home ranges of American badgers of about 1,400 acres and 2,100 acres.

<u>California leaf-nosed bat</u>: The California leaf-nosed bat is a medium-sized species distinguished by its combination of large ears and vertical "leaf-like" projection on its nose. The species is distributed in southern California, extreme southern Nevada and western and southern Arizona (Burt and Grossenheider 1964). It is closely associated with mine shafts and tunnels (Brown 1989 and 1993). Leaf-nosed bats forage primarily along microphyll washes for their insect prey, that includes grasshoppers, beetles and moths. Brown (1992b and 1994) captured and telemetered California leaf-nosed bats during studies in the Cargo Muchacho Mountains, about five (5) miles south of the Project mine and process area. She noted that most foraging occurs within a one (1)-mile radius of the roost site, with forays to a five (5)-mile radius during warm months.

<u>Greater western mastiff bat</u>: The greater western mastiff bat is characterized by its free tail and comparatively large size from other bats in the Project area. Coloration is a deep brown. The geographic range of this species extends from central California south and east into northern Mexico (Burt and Grossenheider 1964; Hall 1981). Habitat for roosting consists of large cracks in exfoliating slabs of granite or sandstone that open downward, typically on cliffs (Williams 1986). Williams (1986), overviewing the status of this species, mentions severe declines for largely unknown reasons.

<u>Spotted bat</u>: The spotted bat is a medium-sized species distinguished from other bats by the three (3) large distinctly patterned light spots on its torso and its large ears. The geographic range of this bat is very extensive, including central Montana, across the Great Basin, Mojave, Sonoran and Chihuahuan Deserts into central Mexico (Hall 1981). Very little is known of the life history of this species. Miller and Stebbins (1964) mention a record from Twentynine Palms. Brown (1992a and 1993), during surveys in the Cargo Muchacho Mountains, may have heard this species.

<u>Townsend's big-eared bat</u>: This is a medium-sized bat with extremely large ears joined across the forehead. Two prominent lumps are also present on the nose. Coloration is olive-brown (Burt and Grossenheider 1964). The geographic range extends from over much of the western United States

into central Mexico (Hall 1981). Known roosting sites in California include caves, mine tunnels, and abandoned buildings. Food consists of a variety of insects. The species is extremely intolerant of disturbance, and even a single visit into a roosting site may cause these bats to abandon the site (Williams 1986).

Yuma myotis: This is a small myotis characterized as having its interfermoral membrane haired almost to its knees. Coloration is brownish. It roosts in colonies in caves, tunnels and abandoned buildings in arid areas. The U.S. Bureau of Reclamation (USBR), overviewing its biology, mentions a close association with water (USBR 1996). The geographic range extends from southwestern Canada across the western United States into northwestern Mexico (Hall 1981).

Cave myotis: The cave myotis is a comparatively large bat identified by a wing membrane that extends to its toes. Coloration is dull brown (Burt and Grossenheider 1964). Roost sites include caves, tunnels, mine shafts and under bridges (USBR 1996). The geographic distribution of the cave myotis extends from the central Oklahoma area through most of Arizona and southwest Texas west into extreme southeastern California and south through most of Mexico (Hall 1981). California records include the Riverside Mountains, 35 miles north of Blythe, and the vicinity of Needles (Hall 1981). Brown (1997; see Appendix J), evaluating the possible use of the Project area by cave myotis, estimated a low potential for roosting and a medium potential for foraging.

Small-footed myotis: The small-footed myotis is one of the smallest bat species in the United States. It is distinguished by yellowish long silky fur and a black mask across the face. Roosting sites include caves, tunnels, rock crevices and forested areas (Burt and Grossenheider 1964). The geographic range is extensive, and includes western Canada, south into the southwestern United States into northwestern Mexico (USBR 1996).

Occult little brown bat: The occult little brown bat is a small bat species characterized by hairs on its back that have glossy tips, giving the pelage a glossy sheen. Roosting sites include caves, mine shafts and tunnels, hollow trees, and buildings (Burt and Grossenheider 1964). The geographic range of this subspecies of little brown bat extends from extreme southeastern California east into western New Mexico, then south into central Mexico (Hall 1981). California records include Ripley, five (5) miles south of Blythe, and the Riverside Mountains (Hall 1981).

Desert pallid bat: The pallid bat is a medium-sized bat identified by its large ears and yellowish fur. Roosts include rock crevices, caves, mine tunnels, buildings and trees (Burt and Grossenheider 1964). The geographic range of the *pallidus* subspecies ranges from northern Utah and Colorado south into central Mexico and west into extreme southeastern California. California records include Indian Cove and Cottonwood Spring at Joshua Tree National Park (Miller and Stebbins 1964).

3.5.6.2. Biological Survey Findings

Systematic biological surveys were conducted coincident with the botanical surveys in July, August, and September 1994; and February, April and May 1995 for the entire Project area, including the Project mine and process area, Project ancillary area, and alternate transmission line corridors, including buffer areas (Rado 1995; see Appendix H). A 120-foot wide corridor centered on the overbuilt 92 kV/34.5 kV transmission line corridor was also surveyed along the entire length of the corridor during August and September, 1995 (Rado 1997). The biological survey also included collection of prior data for the area from other sources, including: the CNDDB for the Hedges, Ogilby and Grays Well NE USGS 7.5 minute quadrangles; discussion with Glamis Imperial staff; and review of prior biological survey reports conducted in the general area (Turner et al. 1980b; Environmental Solutions 1987; Kiva Biological Consulting 1991; Western Resource Development 1993; WESCO 1992; Office of Arid Land Studies 1992; Karl 1994; BLM undated; BLM 1994a). Target species investigations were also conducted as part of the biological survey. Target species investigations included: supplemental bird surveys conducted within the Project area in July 1994 and February, March, and April 1995; rodent live trapping conducted within the Project mine and process area in August 1994; and deer habitat evaluations conducted within and surrounding the Project area in September 1994 (Rado 1995). Additional deer habitat evaluations of the Project mine and process area were conducted in July 1995 (Krausman 1995; see Appendix I), and supplemental bat surveys of this same area were conducted in June 1997 (Brown 1997; see Appendix J). A survey for flat-tailed horned lizard was conducted in June 1997 along the southernmost portion of the overbuilt 92 kV/34.5 kV transmission line corridor (Barrett 1997; see Appendix K). The observations and findings made during these biological surveys are provided in appendices to this EIS/EIR and are briefly summarized below.

Wildlife species and sign observed during surveys included eighteen (18) reptiles, 44 birds, and sixteen (16) mammals. With the exception of the desert tortoise, chuckwalla, and flat-tailed horned lizard, all reptile species are common, widely distributed, and lack special management status. Bird species observed included year-round residents, such as Gambel's quail (*Lophortyx gambelii*), as well as seasonal migrants, such as white crowned sparrows (*Zonotrichia leucophrys*) (Rado 1995).

Mammals include a variety of rodents. Livetrapping results indicate that the dominant rodent species are the Merriam kangaroo rat (*Dipodomys merriami*) and the desert woodrat (*Neotoma lepida*). Larger mammals include such predators as kit fox (*Vulpes macrotis*) and coyotes (*Canis latrans*). An active kit fox pupping den was observed within the Project mine and process area during the survey (Rado 1995). The Project area provides habitat for deer, although the area is not consistent with habitat used to support resident herds (Krausman 1995).

- Federal or State Listed Species:

Desert Tortoise: A single federally listed species, the desert tortoise (*Gopherus agassizii*), was observed throughout the Project area and along the overbuilt 92 kV/34.5 kV transmission line corridor. A total of 32 observations of live animals, 247 burrows and pallets, 103 scat, 2 nesting sites, and 14 carcasses were observed. For reasons which are not known, most of the individuals and sign were observed in the eastern half of the Project mine and process area (Rado 1995). Based on survey information, an estimated total of between 33 and 57 animals are present (Rado 1997).

Gila woodpecker: An adult Gila woodpecker (*Melenerpes uropygialis*), a California-listed endangered species, was observed near the southwest corner of the Project mine and process area on January 12, 1995, by a biologist monitoring exploratory drilling. The individual woodpecker was originally perched on a large ironwood tree in a large wash near the western border of the Project area. Additional searches for this and other Gila woodpeckers, including using recorded bird calls in an effort to elicit a response, were negative. This single observation is believed to have been a transient bird (Rado 1995).

No other federal or California listed or proposed wildlife species were observed during any of the biological surveys within the area of the Proposed Action.

- Other Special Status Wildlife Species:

Several wildlife species that are either USFWS Special Status Species, BLM Sensitive Species, and/or designated state Species of Special Concern were recorded during the surveys. These species include the chuckwalla (*Sauromalus obesus*), flat-tailed horned lizard (*Phrynosoma mcallii*), loggerhead shrike (*Lanius ludovicianus*), sharp-shinned hawk (*Falco striatus*), northern harrier (*Circus cyaneus*), and American badger (*Taxidea taxus*).

Chuckwalla: The surveyed lands were found to contain only marginal chuckwalla habitat. A total of three (3) chuckwallas were observed during surveys of the Project area. All were associated with fractured rocks, where small rock crevices afforded thermal cover and concealment. Although about half of the Project mine and process area is comprised of rocky substrates, larger rock outcrops and associated crevices that constitute optimal chuckwalla habitat are absent from the Project area (Rado 1995).

Flat-tailed horned lizard: Records indicate no occurrence of the flat-tailed horned lizard, a California species of concern, in the vicinity of the Project area. This species is associated with fine, sandy-based soils which are absent from the Project area. This species was not documented during surveys of the Project area or the overbuilt 92 kV/34.5 kV transmission line corridor (Rado 1995; Barrett 1997). However, potential marginal flat-tailed horned lizard habitat is located along portions of the southern end of the overbuilt 92 kV/34.5 kV transmission line corridor (Barrett 1997), and favorable flat-tailed horned lizard habitat exists near the intersection of Ogilby Road and Interstate

Highway 8 (Rado 1995). Sand sheets, extending east from the Algodones Sand Dunes, provide favorable flat-tailed horned lizard habitat north and northwest for an approximate distance of one (1) mile from this road intersection.

White-throated woodrat: The white-throated woodrat was not documented during surveys of the Project area, which included livetrapping and release for small mammals (Rado 1995). The potential for occurrence of this species in the area of the Proposed Action is low (Personal Communication, Nancy Nicolai, BLM, 1996).

Yuma Puma: The Yuma puma, if present in this area, would use the area for hunting deer, a principal prey species. No natural rock shelters or man-made caves or adits that could be used by mountain lions for refuge or concealment are present within the Project area. The biological survey completed by Rado (1995) concluded that the Project area contains a potential prey base population of deer for mountain lions. However, no mountain lion observations, nor any sign of mountain lions (e.g., tracks), were recorded during the biological surveys of the Project area (Rado 1995).

American badger: American badgers utilize the Project area for hunting. A single live badger was observed in a large wash approximately one (1) mile north of the Project mine and process area in September 1994. Additional badger-excavated rodent burrows were observed in the northern portion of the Project area during transect surveys. The entire Project area is probably used by low numbers of badgers for foraging (Rado 1995).

Loggerhead shrike: Loggerhead shrikes were frequently observed during transect surveys. Observations included two family groups, strongly indicating that both foraging and nesting occurs within the Project mine and process area (Rado 1995).

Crissal thrasher: A single crissal thrasher was observed during surveys of the Project area. The species is closely associated with drainages and wash "edge" vegetation. Based on the presence of wash channels, the species may both forage and breed within the Project area (Rado 1997).

Vaux's swift: Vaux's swifts were observed flying over the Project area during the spring bird surveys. The species would be expected to utilize the general area, including the Project area, during spring and fall migration, but the species does not nest in this region (Rado 1997).

Arizona Bell's vireo: No Arizona Bell's vireo were observed within the Project area during the biological surveys. Based on the complete absence of habitat for this species, it would not be expected to be encountered within the Project area (Rado 1997).

Black-tailed gnatcatcher: Black-tailed gnatcatchers were often observed during surveys of the Project area. The species was most frequently observed in secondary drainages, typically those less than twenty (20) feet in width, where young ironwood and palo verde trees provide cover (Rado 1995).

This species most likely breeds in the Project area (Personal Communication, Nancy Nicolai, BLM, 1996).

LeConte's thrasher: No LeConte's thrashers were observed during surveys of the Project area. Surveys for this species were intensive, and included the use of tape-recorded calls to elicit responses from birds during the breeding season (Rado 1995).

- Raptors:

Non-resident raptors and other bird species are expected to seasonally forage in, or migrate through, the Project area. Migrants and other non-resident species would more likely utilize the Project area as winter range than during other seasons. No raptor nests have been observed within the Project area or within adjacent areas (Rado 1995). Raptors observed consist of low numbers of individual birds that utilize the Project area for foraging.

Northern harrier: A total of two (2) northern harrier observations were made during the surveys. Both observations occurred in September and consisted of a single animal foraging over the western portion of the Project area. Based on these findings, the northern harrier appears to seasonally utilize the Project area for foraging (Rado 1995).

Sharp-shinned hawk: A single sharp-shinned hawk was observed in the northwestern portion of the Project area during September. This single bird was observed foraging in the largest ephemeral stream channel system along the western edge of the Project mine and process area. No additional observations were made. Based on this single observation, the species appears to infrequently forage in the larger ephemeral stream channels which transect the Project area (Rado 1995). The sharp-shinned hawk probably occurs throughout the Project area as a seasonal winter migrant. Low numbers of birds may utilize the general area, including the Project area, for foraging during winter months.

Peregrine falcon: Surveys of the Project area did not document the occurrence of the American peregrine falcon (Rado 1995 and 1997). The species has also not been recorded during prior inventories of this area (BLM records; BLM 1994a; Condor 1991). The steeply walled canyons and cliffs favored by this species for nesting are absent from the Project area and surrounding area. Additionally, the Project area is not proximate to wetland habitats also favored by peregrine falcons for foraging.

Golden eagle: Surveys of the Project area did not document the occurrence of any golden eagles (Rado 1995). The golden eagle could infrequently utilize the general area, including the Project area, for foraging during winter months.

Ferruginous hawk: No ferruginous hawks were observed during surveys of the Project area (Rado 1995). The ferruginous hawk could infrequently utilize the general area, including the Project area, for foraging during winter months.

Burrowing owl: No burrowing owls were observed during surveys of the Project area (Rado 1995). The burrowing owl may utilize the general area, including the Project area, for foraging.

Cooper's hawk: No Cooper's hawks were observed during surveys of the Project area (Rado 1995). However, low numbers of birds may utilize the general area, including the Project area, for foraging during winter months.

Long-eared owl: No long-eared owls were recorded during surveys of the Project area (Rado 1995). Potential nesting habitat occurs in the Project area (Personal Communication, Nancy Nicolai, BLM, 1996). The long-eared owl may utilize the general area, including the Project area, for foraging.

Prairie falcon: No prairie falcons were observed during the biological surveys (Rado 1995). Prairie falcons may utilize the general area, including the Project area, for foraging. There are no potential nesting sites for prairie falcons within the Project mine and process area.

Barn owl: No barn owls were observed during the biological surveys, but no owl surveys were conducted. Barn owls may utilize the general area, including the Project area, for foraging (Rado 1995).

- Bat Species:

Several bat species were identified from vocalizations, including two audible passes over the Project mine and process area by western mastiff bats by Brown (1997). The characteristic signals of pocketed free-tailed bats (*Nyctinomops femorosaccus*) were also detected on three occasions, and sounds of both western pipistrelles (*Pipistrellus hesperus*) and the California myotis (*Myotis californicus*) were detected. However, conditions generally suitable for breeding and roosting were not observed within the Project mine and process area. Individual colonial bats may roost in the palo verde or ironwood trees within the Project area, or may utilize the few small rock crevices found within the Project area. Although suitable colonial roosting sites are not available, one or more sensitive bat species may also forage in the area. Several sensitive species of bats are known to inhabit areas of the Cargo Muchacho Mountains, approximately six (6) miles southeast of the Project area. Surveys of the American Girl Mining Project site (BLM 1994a) have documented the occurrence of the California leaf-nosed bat (*Macrotus californicus)*, Townsend's big-eared bat (*Plecotus townsendii*), and Western mastiff bat *(Eumops perotis)*. Two other sensitive bat species, the Spotted bat (*Euderma maculatum*) and the Cave myotis (*Myotis velifer*), may also have been heard during these surveys of the American Girl Mining Project site. Each of these species may utilize the Project area for foraging (Brown 1997).

A survey and focused assessment of the Project area with respect to bat habitat and occurrences was conducted by a third-party consulting biologist (Brown 1997). This assessment, which is provided as Appendix J, concludes that, as no mine adits, caves, or large rock crevices exist in the Project area, the sensitive bat species, including the Townsend's big-eared bat, western mastiff bat, and spotted bat, would not day-roost in the Project area, but they could forage in the Project area at night.

Desert washes are the prime type of foraging habitat of the California leaf-nosed bat. Leaf-nosed bat populations have been documented in the Cargo Muchacho and eastern Chocolate Mountains. Leaf-nosed bats usually forage within five (5) miles of their roosts in warm months. During summer months they may roost at night between foraging flights in trees in the washes, but in colder months they return to caves or mine shafts or adits for night roosting. As no caves or mine shafts or adits exist in the Project area, leaf-nosed bats would not roost in the area during the day, but could roost in the trees in the Project area at night between foraging bouts. The nearest known diurnal roost to the Project area is a mine adit approximately 4.5 miles south in the Cargo Muchacho Mountains. However, since the distance of the nearest diurnal roost to the Project area approaches the foraging range of the bat, Brown (1997) concluded that, unless a leaf-nosed bat diurnal roost is discovered closer to the Project area, the Project area is probably not regularly visited by the leaf-nosed bat. Other bats, including most *Myotis* species and bats of the *Tadarida* and *Eumops* genera, forage farther from their roosting areas than the leaf-nosed bat and, thus, may forage in the Project area. The USFWS Special Status or California Species of Concern (CSC) bats which could possibly roost on, or forage over, the Project area are identified in Table 3.11.

Table 3.11: USFWS Special Status Species and California Species of Concern Bat Species Which Could Roost On, or Forage Over, the Imperial Project Area

Common Name	Scientific Name	Status	Roost	Forage
Yuma myotis	*Myotis yumanensis*	USFWS	Low	Medium
Small-footed myotis	*Myotis ciliolabrum*	USFWS	Low	Low
Cave myotis	*Myotis velifer*	USFWS/CSC	Low	Low
Occult myotis	*Myotis lucifugus occultus*	USFWS/CSC	Low	Low
Desert pallid bat	*Antrozous pallidus*	CSC	High	High
Townsend's big-eared bat	*Plecotus townsendii*	USFWS/CSC	None	Low
Spotted bat	*Euderma maculatum*	USFWS/CSC	None	Low
Western mastiff	*Eumops perotis*	USFWS/CSC	None	High
Big free-tailed	*Nyctinomops macrotis*	USFWS/CSC	None	Low
Pocketed free-tailed	*Nyctinomops femorosaccus*	CSC	None	High
California leaf-nosed bat	*Macrotus californicus*	USFWS/CSC	None	Medium

Source: Brown 1997

- Game Species:

Several species of game birds are present within the Project area, including Gambel's quail, mourning dove (*Zenaida macroura*) and white-winged dove (*Zenaida asiatica*), which were observed in the moderate-to-larger ephemeral stream channels (Rado 1995). These hunted species are common residents or migrants in the area (see Section 3.9.2.3).

Mule deer: Mule deer are widely distributed throughout the Project area and surrounding vicinity. Based upon a survey of the ephemeral stream channel system, it was found that the channels are regularly used by deer, with principal movements occurring at night (Rado 1995). Deer sign (i.e., tracks and/or scat) were observed in all major channels within the Project mine and process area, and those extending one (1) or more miles from the Project mine and process area boundaries. The microphyll woodlands typical of these channels apparently serve as movement corridors for the deer. However, fresh deer tracks and scat were also regularly observed on the interspersed desert pavement, showing that deer are dispersed and move freely about cross-country between drainages. No permanent water sources are present within the boundaries of the Project mine and process area which would serve to concentrate deer; however, a CDFG-managed "guzzler" constructed to provide a water source for deer is located off of Hyduke Road, approximately two (2) miles south-southwest

of the Project mine and process area. This water source is believed to contribute to the observed east-west movement of deer through the Project area, at approximate right angles to the washes. After the biological field surveys, two (2) new "guzzlers" were reported to have been constructed by the CDFG/Imperial County Fish and Game Commission (ICFGC) approximately 0.8 miles and 2.5 miles, respectively, from the eastern boundary of the Project mine and process area in September 1995 (Personal Communication, Ted Rado,1995; Rister 1996). Approximate locations of these three "guzzlers" with respect to the Project mine and process area are shown on Figure 3.14. In addition, numerous natural "tinajas," which provide seasonal water sources for deer and other wildlife, are located in the mountainous portions of the Indian Pass and Picacho Peak Wilderness Areas, and other "guzzlers" are located in the Cargo Muchacho Mountains (Rister 1996)

A focused evaluation of the Project area with respect to deer was conducted contemporaneous with the biological survey by a third-party consulting biologist (Krausman 1995). This evaluation, which is provided as Appendix I, included reviewing reports of previous deer investigations in the vicinity of the Project area, reviewing potentially applicable deer herd management plans, communicating with other consulting biologists and agency biologists, and an inspection of the Project area in July 1995.

The evaluation concludes that there is some ambiguity as to whether or not the desert deer in the Project area are a subspecies of deer called the "burro" deer (*Odocoileus hemionus eremicus*), which some have reported to differ from desert mule deer (*Odocoileus hemionus crooki*) based on physical differences in the deer. However, more recent investigations suggest there may be no difference in the mitochondrial DNA haplotype of the "burro" deer to distinguish it from other mule deer populations. Whether the deer in the area are "burro" deer or desert mule deer, their ecology is reported to be similar and habitat components include washes (ephemeral stream channels) with dense vegetation, rolling to steep topography, and water availability. Fawning typically occurs in low, broken hills with vegetated washes near water (Celentano and Garcia 1984).

In late summer the deer move away from the Colorado River to the desert mountains, and in the late spring they return to the river. Migration routes follow major desert wash systems, and the ephemeral stream channels in the Project area are used by deer as evidenced by tracks and pellets. However, steep topography does not exist within the boundaries of the Project mine and process area, nor does a water source. It was noted that "... the area in and around the Imperial Project is used by deer moving across the desert flats from mountain foothills to water sources or other important habitat components (Krausman 1995)." By comparison, mule deer in the Belmont Mountains of Arizona were more probably limited by forage availability than by any other factor, including water availability, and that the Belmont Mountain forage area provided more vegetation than the desert flats provide around the Project area. Based on this comparison, the Project area was judged to be inconsistent with habitat used to support a resident deer herd or as important deer fawning habitat.

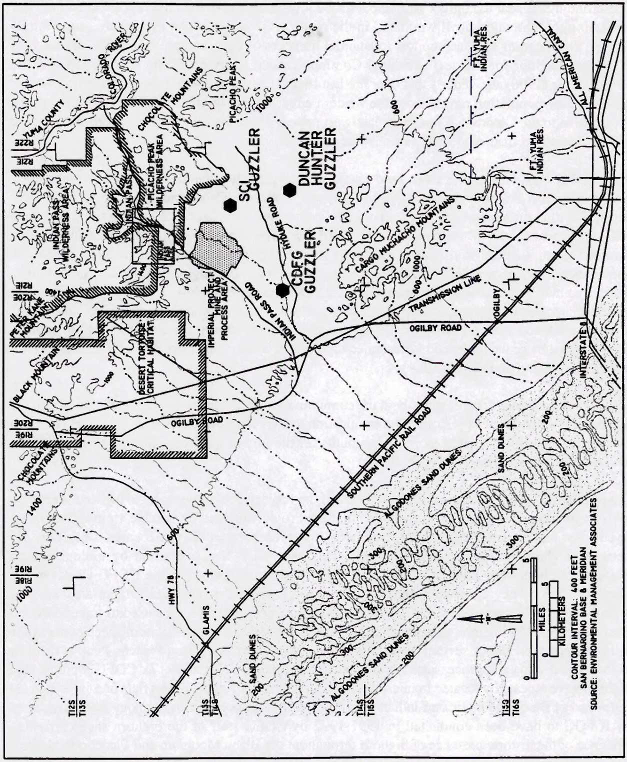

Figure 3.17: Selected Topographic and Biological Landmark Features in the Vicinity of the Project Area

These findings appear to conflict with unpublished information provided by the CDFG and ICFGC indicating that the microphyll woodland in the major washes within the Project area and vicinity provide deer fawning habitat, support substantial numbers of deer, and provide a critical east-west migration corridor for the deer (Personal Communication, Rusty McBride, CDFG, 1995; Rister 1996). Rister (1996) also reports that over the last two (2) decades, the ICFGC has determined that the local deer population ranges from the western edge of the Algodones Sand Dunes through the Project area to the Colorado River in an east-west pattern of summer/winter migration, utilizing the various identified man-made and natural water sources.

The CDFG has prepared a deer herd management plan for the deer population inhabiting southeastern San Bernardino, Riverside, and Imperial Counties (Celentano and Garcia 1984). Deer densities within the general area were reported to average approximately 0.2 animals per square mile (Celentano and Garcia 1984 after McLean 1940). However, because of low density and scattered distribution, an accurate estimation of the desert deer herd population is difficult. CDFG records of hunter success in the area have trended upwards since the 1940's, suggesting the deer herd density in the area may be increasing (see Section 3.9.2.3). Deer move seasonally in order to take advantage of water supplies and forage. Principal use of areas removed from the Colorado River takes place during the fall and winter. Fawning typically occurs in the late summer or early fall, within habitats characterized by broken hills and interconnecting washes within one (1) mile of a dependable water source (Celentano and Garcia 1984).

The CDFG is especially concerned about the cumulative loss of microphyll woodland habitat utilized by deer and other species (Personal Communication, Nancy Andrew, CDFG, 1996). CDFG has also estimated that vehicle-related mortality accounts for the loss of one (1) to three (3) percent of the deer population in the region (Wolf 1996).

Desert bighorn sheep: Krausman (1995) evaluated the Project area with respect to bighorn sheep that may range in the vicinity. It was concluded that the Project area and immediate vicinity are not in, or adjacent to, bighorn sheep habitat, and there is no evidence that the Project area is in a corridor between bighorn habitat (Krausman 1995). This analysis is also supported by biologists who evaluated southeastern Imperial County for bighorn sheep on behalf of the CDFG (Weaver and Mensch 1968). They concluded that the area encompassing the proposed Project area was not bighorn seasonal or permanent range. No dispersal corridors that would be used to travel between mountain ranges by bighorn were identified (Weaver and Mensch 1968). Bighorn sheep occur in the hills and mountain slopes several miles east of the Project area, including Picacho Peak to the east of the Project mine and process area, and Peter Kane Mountain (Figure 3.17). CDFG reported that bighorn were repeatedly located in microphyll woodland habitats in the desert flats one (1) to two (2) miles east of Black Mountain and Indian Pass (Wolf 1996). Population and ecology studies reported by ICFGC to have been conducted in 1991-1992 by CDFG staff of the bighorn sheep provided evidence of the historic presence of bighorn throughout the Black Mountain and Picacho Peak area, and seasonally in the Cargo Muchacho Mountains (Rister 1996). Rister (1996) also states that CDFG has photographs which document the use of guzzlers in these areas by bighorn sheep.

A single radio-telemetered ram, originally recorded from the Peter Kane Mountain area, was documented at the extreme northern end of the Cargo Muchacho Mountains, about five (5) miles southeast of the Project mine and process area (Personal Communication, Rusty McBride, CDFG, 1995). The specific route this ram traveled to arrive in the Cargo Muchacho Mountains is not known. There is some speculation that the bighorn would likely have traveled along the ridge extending through Indian Pass from Black Mountain toward Picacho Peak (Personal Communication, Nancy Andrew, CDFG, 1996), although others have thought that the ram would have taken the more direct path, directly through the Project mine and process area (Rister 1996). Rister (1996) believes that the Project area is in a north/south migration path for the bighorn sheep. However, no bighorn sheep trails were identified during the surveys of the Project area; therefore, the area is not currently considered to be a bighorn movement corridor.

3.6. Cultural and Paleontological Resources

3.6.1. Regulatory Framework

Federal regulations (36 CFR Part 800.2) define historic properties as "any prehistoric or historic district, site, building, structure, or object included, or eligible for inclusion in, in the National Register [of Historic Places]." Section 106 of the National Historic Preservation Act [NHPA] (Public Law 89-665; 80 Stat 915; USC 470, as amended) requires a federal agency with jurisdiction over a project to take into account the effect of the project on properties included in or eligible for the National Register of Historic Places (NRHP), and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The term "cultural resource" is used to denote a historic or prehistoric district, site, building, structure, or object, regardless of whether it is eligible for the NRHP.

3.6.2. Cultural Resources

In addition to other changes, this section has been substantially modified from the November 1996 Draft EIR in response to comments to: undertake and complete an intensive cultural resource resurvey of all areas of potential surface disturbance with the involvement of the Native Americans; and undertake meaningful consultation with the Quechan Indian Tribe and other Native American tribes.

Cultural resource inventories were first conducted for the Imperial Project by ASM Affiliates, Inc. (1996a, 1996b). Responding to comments from the Quechan Indian Tribe and other public comments, the BLM determined in June, 1997 that additional surveys should be undertaken with tribal participation. Additional archaeological survey and background research was conducted by KEA Environmental, Inc. (Pigniolo et al. 1997), and additional ethnohistoric research was conducted by Tierra Environmental Services (Baksh 1997). The KEA and Tierra reports, supplemented by previous research in the area, form the basis for the following discussion of cultural resources; the

non-confidential portions of the KEA report, which summarizes (and includes as an appendix) the Tierra report, is provided in Appendix L of this EIS/EIR.

3.6.2.1. Cultural History

Five major periods of potential human occupation or use of the Project area were identified.

The Malpais period is thought by some archaeologists to predate 12,000 years before present (12,000 years B.P.), but this dating has not been confirmed scientifically. Sites considered typical of the Malpais consist of highly patinated crude stone tools, rock rings, and other rock features. However, none of these sites has been clearly dated prior to 12,000 years B.P. (Moratto 1984; Pigniolo et al. 1997; Schaefer 1994).

The Paleoindian period (12,000 years to 7,000 years B.P.) evidences the first well-dated Native American occupation of the region. At least three distinct cultural complexes potentially relevant to the area of the Proposed Action have been identified during this time-frame. The fluted point complex is manifested throughout the western states, but in California most fluted points have been found in isolated surface contexts, severely constraining the reconstruction of cultural relationships and patterns. More commonly occurring are the Lake Mojave and San Diego complexes, which share several key artifact types. The Lake Mojave complex was centered in the southwestern Great Basin, while the closely related San Dieguito complex has been found more widely, from coastal California to the Colorado Desert, including, potentially, the area of the Proposed Action. Artifacts typical of the San Dieguito complex include crescentics, scrapers, and large bifaces. Site types identified as San Dieguito in the Colorado Desert typically consist of trails, cleared circles, rock rings, other rock features and heavily varnished crude stone tools. However, confirming the absolute dates of sites thought to be San Dieguito is typically difficult due to an absence of organic remains suitable for radiocarbon assay. Attempts have been made to date San Dieguito sites by the degree of patination developed on stone tools, but patination is affected by a variety of locally variable conditions, and this dating technique is not generally considered definitive (Harry 1992).

The Archaic period (7,000 years to 1,500 years B.P.) is poorly represented in the Colorado Desert, and few sites have been securely dated to this interval. The reasons for this are poorly understood, because elsewhere sites post-dating 4,000 years B.P. increase in frequency. In neighboring regions the Archaic period generally saw a diversification of artifact assemblages, including the introduction of the widespread use of groundstone technologies, signaling the increased importance of hard seeds and other plant foods requiring grinding. These trends probably occurred in the Lower Colorado River area as well, but evidence is lacking in the immediate area of the river due to flooding. The atlatl was the principal weapon utilized in hunting, and a variety of stemmed, corner-notched and side-notched dart points of the Pinto and Amargosa series are considered time-markers of the Archaic period in the southern California deserts.

The Patayan (or Late Prehistoric) Period (1,500 years to 450 years B.P.) saw the introduction of floodplain horticulture, ceramics, and the bow and arrow. Native American populations in the vicinity of the area of the Proposed Action appear to have expanded dramatically at this time. In addition to population growth associated with the introduction of agriculture and more sedentary villages along the Lower Colorado River, increased occupation of the deserts was prompted by cyclic fillings of Lake Cahuilla, in the Salton Trough of the Imperial Valley, resulting from the natural diversions of the Colorado River. This series of very large fresh-water lakes was very attractive to human utilization in an otherwise arid environment of low biotic productivity. By this time, an extensive trail system across the desert linked the Lower Colorado River peoples with related groups and with religious and cultural shrines to the north, south, east and west. Extensive trade networks connected agricultural groups in the greater Southwest with the Gulf of California and the Pacific Ocean.

Spanish exploration of the Lower Colorado area began with the visits of Alcarón and Melchior Diaz in 1540, ushering in the Historic period. The impact of 16th century exploration on Native peoples appears to have been relatively minimal in the Lower Colorado area, although elsewhere severe epidemics appear to have preceded Euroamerican colonization (Cook 1978). In the following century, however, Spanish settlement of the colonial frontier quickly engendered increased raiding, intergroup military/political alliances, and slave-trading in the Lower Colorado River area (Forbes 1965). This was also a period of increased movement of Native American groups along the Colorado River corridor (Forbes 1965). At least by the time of the 1701-1702 Kino expedition, the Quechan were established in the Yuma area and controlled a territory from 20 miles north of Yuma to just south of Pilot Knob. They held an area some 20 miles up the Gila River in Arizona to the Sand Hills in the west. The establishment of Yuma Crossing and Fort Yuma in 1852 brought increased Euroamerican settlement to the vicinity of the area of the Proposed Action. Mining was well established in the Tumco-Hedges district by 1884. The Project area was utilized for desert warfare training during World War II, and one of General Patton's major camps, Camp Pilot Knob, is crossed by the existing Sidewinder Road and the existing 34.5 kV transmission line which is to be overbuilt with a 92 kV transmission line as part of the Proposed Action.

The area in and around the Project mine and process area was heavily used by Native Americans for religious observances, as a travel route, and as a source for tool-grade lithics. Archaeological evidence indicates that there were no permanent habitation sites in the immediate area; however, the Project mine and process area is proximate to both Indian Pass and the Indian Wash area, which were natural travel corridors through which substantial foot traffic traveled from the area of the Colorado River to the inland desert areas and north along the Colorado River. Native American travel through the area is marked by an extensive network of trail segments that are most apparent on stable desert pavements. Trails were important not only economically but also as an integral part of Quechan belief systems. This is evidenced archaeologically by shrines that were often erected along trails (Rogers N.D.; Waters 1982) and by several geoglyphs in the Project area found in close proximity of trails. Ethnographic and ethnohistoric accounts (Forbes 1965; Forde 1931) tell of a close connection of trails to religious beliefs centered on the dream world, which was a source of

knowledge and power for traditional religious practioners. Members of the Quechan tribe have identified a geoglyph in the vicinity of the Project ancillary area as having been made by the Quechan in the 1940's and have cited this geoglyph as evidence of continuing religious use of the area. The Indian Pass Area of Critical Environmental Concern (ACEC) (see Section 3.9.2.2), located about three-quarters (3/4) of a mile north of the Project mine and process area (see Figure 3.12), was specifically designated to protect cultural resources in the form of prehistoric artifacts located in Indian Pass and the adjacent Chocolate Mountains. The ACEC contains an extensive assemblage of Native American scratched petroglyphs. Native American use of the Project area for toolstone procurement is evidenced by the numerous "flaking stations" located on desert pavements. Some wide-ranging foraging activities may also be evidenced from the cleared circles and rock rings that may represent short-term encampment, as well as religious activities.

3.6.2.2. Native American Values

The NHPA, the American Indian Religious Freedom Act (AIRFA) and the Executive Order 13007 require federal agencies to consider Native American concerns in their land-use decisions and to grant access to Native American groups for religious observations, where possible. The BLM has issued internal guidelines which instruct that this consultation should be initiated early in the project review or decision-making process, and be conducted at the highest levels within the BLM jurisdiction responsible for the decision. The BLM initiated this consultation process with the Quechan Tribe in 1996, and the Quechan Tribe subsequently requested that members be directly involved in the cultural resource study and report. The consultation process is ongoing as of September 1997.

In addition to this consultation process, a third-party ethnographic study based principally upon consultation with the Quechan Tribe has been completed to help identify contemporary Native American concerns and values associated with the area of the Proposed Action, document current Native American knowledge about the function and/or interpretation of available resources, and record the meaning and significance of resources to Native Americans today. The study also attempted to assist the BLM in its significance evaluation of sites and their eligibility for the NRHP (see also Section 4.1.6.1), and to identify mitigation measures that Native Americans believe would be appropriate to minimize Proposed Action-related impacts to sensitive cultural resources

Native American groups, most notably the Quechan Indian Tribe but also including the Colorado River Indian Tribes and the Fort Mojave Indian Tribe (all of which are federally recognized groups), have expressed strong cultural connections to the Project area, and strong concerns about the Proposed Action. This has included letters commenting on the November 1996 Draft EIS/EIR from the Quechan tribal chairperson, the Quechan Tribe's cultural committee, and interested tribal members; participation in public hearings on the November 1996 Draft EIS/EIR; and participation in a series of meetings with the BLM and the cultural resource contractors held since December, 1996. Native American concerns center on the following issues:

- The Project mine and process area is located within an area of high religious, cultural, and educational value to the Quechan;

- The area is connected by a trail system to several other areas of similar importance, including Pilot Knob, Picacho Basin and Muggins Mountain; these trails are important in Quechan belief systems;

- The area has been used as recently as the 1940's for specific religious observances that can only occur in this place; Quechan tribal members plan to conduct such observances at this location in the future;

- The area is necessary for religious practioners to gain requisite knowledge for continuation of Quechan religious beliefs and practices;

- The area is necessary for teaching Indian youth about Quechan tribal history, religion, and culture; and

- The Quechan nation has stated that development of the mine pits, heap, and waste rock stockpiles would destroy their ability to perform their religious, cultural and educational practices.

3.6.2.3. Survey Results

An intensive Class III pedestrian survey and cultural resources inventory of the survey area (the Project area and additional buffer areas) was first conducted by ASM Affiliates, Inc. in 1996 (ASM 1996a). A total of 2,212 acres were included in the area surveyed: 1,648 acres occupying the Project mine and process area and Project ancillary area (less the 335 acres which had been previously surveyed at the same level), as well as an additional 564 acres of buffer area adjacent to these areas. Subsequently, an intensive Class III cultural resources inventory of the overbuilt 92 kV/34.5 kV transmission line corridor and buffer areas was conducted by ASM Affiliates, Inc. (ASM 1996b). These intensive surveys were conducted to inventory the cultural resources within the survey areas and to evaluate these resources for eligibility under the National Register of Historical Places (NRHP) guidelines.

In response to concerns expressed by the Quechan Tribe and others, the survey area was expanded and entirely resurveyed by KEA Environmental, Inc. with Quechan participation. The expanded survey area included the Project mine and process area with a 500-foot buffer (a total of about 2,000 acres); the Project ancillary area, including a 50-foot buffer on the northwest side of Indian Pass Road and a 150-buffer southeast of the proposed transmission line; and a 200-foot (or greater) area along the existing 34.5kV transmission line that would be overbuilt with a 92 kV transmission line as part of the Proposed Action. In addition, eight transect surveys spaced equidistantly around the Project mine and process area were subjected to archaeological reconnaissance to provide some

comparison of the cultural resources of the Project mine and process area vicinity of the Project mine and process area itself. As with the previous surveys, the goal of the survey was to inventory cultural resources that could be affected by the Proposed Action and to evaluate their eligibility for the NRHP.

The entire survey area was subjected to pedestrian survey at a maximum 20-meter interval between crew members. Within cultural resource site areas, the transect interval was reduced to a maximum of 5 meters. Due to a high density of cultural material, virtually the entire Project mine and process area was surveyed at the reduced interval. Due to poor contrast between cultural materials and the surrounding ground surface, 5-meter transects were also utilized in many non-site areas in the Project ancillary area and along the overbuilt 92 kV/34.5 kV transmission line corridor. This reduced transect interval allowed for more intensive coverage and resulted in a dramatic increase in the total number of cultural features recorded both in the Project mine and process area and along the overbuilt 92 kV/34.5 kV transmission line corridor.

The survey was conducted in two concurrent phases. Initially, the survey crews flagged cultural features and artifact concentrations. Subsequently, the recording crew: recorded feature locations, including chipping stations, using sub-meter global position system (GPS) units; noted assemblage content and other relevant information; and recorded a sample of features through photographs and sketches. Members of the Quechan tribe accompanied the archaeological recording crew. They provided input on the interpretation of potential cultural features and helped to identify and record cultural materials. Recording in much of the Project area was assisted by Mr. Jay von Werhlof of the Imperial Valley College Museum.

The results of the survey are summarized in Table 3.12. Twenty-four sites and one (1) isolated artifact were recorded in the Project mine and process area. It should be noted that application of the site recording guidelines of the California Office of Historic Preservation (1995) resulted in the realignment of site designations previously recorded for this area. In accordance with these guidelines, prehistoric trails are now designated by distinct numbers, even though they may be found within larger archaeological sites. There are sixteen (16) prehistoric trail sites within the Project mine and process area. Additionally, because of increased recordation of surface density, many sites that had previously been recorded as separate occurrences have now been grouped into seven (7) larger multi-component sites. These sites contain a variety of Native American artifacts and features, including thousands of flaking stations; over 60 ceramic concentrations; a limited amount of groundstone; pecked rocks, possibly associated with bipolar reduction; rock circles; cleared circles; geoglyphs; shaman's hearths; vision quest loci; and a scratched petroglyph. The flaking stations include a high frequency of broken quartz, which may reflect religious activities as well as toolstone procurement. In addition to trail sites and multi-component sites, one (1) flaking station received a separate site designation. There is also evidence of recent mining claims and rock-hound activities that have not been recorded as historic.

Native American cultural materials are not evenly distributed throughout the Project mine and process area. The densest concentration is found along a terrace east of Indian Pass Road. The frequency of cultural materials decreases east and west of this terrace. Within this overall distribution, several clusters of cultural features were also noted. One such cluster occurs in the area of the West Pit.

Historic period materials and features also occur within the multi-component sites. Most of this is associated with a World War II era military training camp located within CA-IMP-4970, but this material also occurs within other sites. World War II-era materials include tent pads, historic refuse (cans, glass, ceramics), rock cairns, and craters.

Table 3.12: Summary of Cultural Resources Identified within the Area of the Proposed Action

SUMMARY OF CULTURAL RESOURCES IDENTIFIED WITHIN THE AREA OF THE PROPOSED ACTION		
Resource Number	**Description**	**National Register Evaluation (Significance/Criteria)**
Mine and Process Area (N = 24 Sites, 1 Isolate)		
CA-IMP-4970	Multi-component	Eligible/A, C, D
CA-IMP-4971	Multi-component	Eligible/A, C, D
CA-IMP-5010	Prehistoric trail	Eligible/C, D
CA-IMP-5061	Multi-component	Eligible/A, D
CA-IMP-5067	Multi-component	Eligible/A, D
CA-IMP-5494	Multi-component	Eligible/D
CA-IMP-5526	Multi-component	Eligible/A, C, D
CA-IMP-7388	Prehistoric trail	Eligible/D
CA-IMP-7408	Multi-component	Eligible/A, D
F-4	Prehistoric trail	Eligible/C, D
F-298	Prehistoric trail	Eligible/C, D
F-745	Prehistoric trail	Eligible/D
F-940	Prehistoric trail	Eligible/D
F-1020	Prehistoric trail	Eligible/D
F-1336	Prehistoric trail	Eligible/D
F-1500	Prehistoric trail	Eligible/C, D
F-1792	Flaking station	Not Eligible
F-2142	Prehistoric trail	Eligible/D
F-2202	Prehistoric trail	Eligible/D
F-2282	Prehistoric trail	Eligible/D
F-2294	Prehistoric trail	Eligible/D
F-3024	Prehistoric trail	Eligible/C, D
F-4028	Prehistoric trail	Eligible/C, D
F-4132	Prehistoric trail	Eligible/C, D
F-4018	Isolated metate	Not Eligible
Ancillary Area (N = 18 Sites, 2 Isolates)		
CA-IMP-2727	Multi-component (Running Man site)	Eligible/A, C, D
CA-IMP-5359	Prehistoric trail	Eligible/C, D
CA-IMP-5360	Prehistoric trail	Eligible/C, D
CA-IMP-6661	Ring geoglyph, possible anthropomorph	Eligible/C, D
AA-1	Lithic scatter, historic component	Not Eligible
AA-2	Lithic scatter	Not Eligible
AA-3	Lithic scatter	Not Eligible

SUMMARY OF CULTURAL RESOURCES IDENTIFIED WITHIN THE AREA OF THE PROPOSED ACTION		
Resource Number	**Description**	**National Register Evaluation (Significance/Criteria)**
F-3147	Flaking station	Not Eligible
F-3167	Shaman's hearth	Eligible/Contributing to ATCC
F-3169	Flaking station	Not Eligible
TL-1	Recent rock ring encircling a cairn	Not Eligible
TL-2	Lithic scatter	Not Eligible
TL-3	Ring geoglyph	Eligible/C, D
TL-4	Ceramic scatter	Eligible/D
TL-5	Ring geoglyphs	Eligible/C, D
TL-42	Ring geoglyphs	Eligible/C, D
TL-43	Lithic scatter	Not Eligible
TL-44	Ceramic scatter	Eligible/D
TLI-1	Isolated pecked rock	Not Eligible
TLI-8	Isolated WWII era flashlight part	Not Eligible
Transmission Line Corridor (N = 46 Sites, 6 Isolates)		
CA-IMP-1469	Prehistoric trail	Eligible/D
CA-IMP-1471	Possible prehistoric trail	Indeterminate
CA-IMP-7276	Two large geoglyphs, ring geoglyphs	Eligible/C, D
CA-IMP-3297	Prehistoric ceramic scatter, mining era refuse	Eligible/D
CA-IMP-4131	Ceramic scatter, geoglyph, WWII era component	Eligible/C, D
CA-IMP-7269	Probable prehistoric trail, mining era component	Eligible/D
CA-IMP-7272	Prehistoric trail	Eligible/D
CA-IMP-7273	Historic campsite, with rock alignment	Not Eligible
CA-IMP-7274	Probable historic trail, historic component	Indeterminate
CA-IMP-7275	Probable historic trail, historic component	Indeterminate
CA-IMP-7276	Ring geoglyph, ring geoglyph, ceramic scatter	Eligible/C, D
CA-IMP-7339	Ceramic scatter, not relocated	Not Eligible
CA-IMP-7340	Lithic scatter	Not Eligible
TL-6	Recent rock ring encircling a cairn	Not Eligible
TL-7	Rock alignment, possibly historic	Not Eligible
TL-8	Ceramic scatter	Eligible/D
TL-9	WWII era refuse scatter	Not Eligible
TL-10	Three ring geoglyphs	Eligible/C, D
TL-11	Ring geoglyph with stone in center	Eligible/C, D
TL-12	WWII era refuse scatter	Not Eligible
TL-13	Three trails, probably historic	Not Eligible
TL-14	Seven possible WWII era foxholes	Not Eligible

SUMMARY OF CULTURAL RESOURCES IDENTIFIED WITHIN THE AREA OF THE PROPOSED ACTION		
Resource Number	**Description**	**National Register Evaluation (Significance/Criteria)**
TL-15	Ring geoglyph	Eligible/C, D
TL-16	Three ring geoglyphs	Eligible/C, D
TL-17	Possible geoglyph	Not Eligible
TL-16	Ceramic scatter	Eligible/D
TL-19	WWII era refuse scatter	Not Eligible
TL-20	Refuse scatter, mining and WWII era components	Not Eligible
TL-21	Mining era refuse scatter	Not Eligible
TL-22	Historic trail network	Not Eligible
TL-23	Buried historic water pipeline	Indeterminate
TL-24	Possible historic trail	Indeterminate
TL-25	Lithic quarry	Eligible/D
TL-26	Two ring geoglyphs	Eligible/C, D
TL-27	WWII era refuse scatter	Not Eligible
TL-28	Refuse scatter, mining and WWII era components	Not Eligible
TL-29	WWII era refuse scatter	Not Eligible
TL-30	Lithic scatter	Not Eligible
TL-31	WWII era refuse scatter	Not Eligible
TL-32, TL-33, TL-34, TL-35	Camp Pilot Knob, two sets of three cleared circles, three ring geoglyphs	Eligible/A, D
TL-36	Prehistoric trail	Eligible/D
TL-37	Prehistoric trail	Eligible/D
TL-38	Prehistoric trail	Eligible/D
TL-39	Road to Tumco/Hedges	Eligible/D
TL-40	Prehistoric trails	Eligible/C, D
TL-41	Prehistoric trail	Eligible/C, D
TLI-2	Isolated hammerstone	Not Eligible
TLI-3	Isolated historic brake shoes	Not Eligible
TLI-4	Isolated historic Ford radiator	Not Eligible
TLI-5	Isolated historic universal joint	Not Eligible
TLI-6	Isolated historic ironstone plate	Not Eligible
TLI-7	Isolated WWII era dry cell battery	Not Eligible

Survey of the Project ancillary area yielded a total of eighteen (18) sites and two (2) isolates. Sites included one (1) multi-component site, two (2) trail sites, seven (7) lithic scatters or flaking stations, two (2) ceramic scatters, four (4) geoglyphs, a shaman's hearth, and a relatively recent rock feature of non-traditional design. The multi-component site CA-IMP-2727 includes a feature known as the Running Man geoglyph which post-dates Rogers' recording of the site in the 1930's. The proposed

new transmission line/water pipeline passes northwest of this geoglyph feature. A human bone fragment found by others in the Running Man geoglyph area was determined to be from a modern cremation.

Survey of the overbuilt 92 kV/34.5 kV transmission line corridor, which currently contains the existing 34.5 kV transmission line, yielded 46 sites and six (6) isolates. Sites included thirteen (13) trail sites (prehistoric and/or historic), nine (9) geoglyphs, three (3) lithic scatters, four (4) ceramic scatters, thirteen (13) historic sites (mining refuse, World War II-era sites), two (2) prehistoric/historic sites, and two (2) rock features of non-traditional design. The prehistoric/historic sites include Camp Pilot Knob, a major World War II-era training camp established by General Patton.

Three small bone fragments were previously discovered near the Project area in April, 1997 by Karen Collins of Imperial Valley College while conducting an archaeological training class on site recording. This training session was totally independent from the Imperial Project. The fragments were collected by the BLM for identification (human/non-human) by a forensic anthropologist. Dr. Madeleine Hinkes, Ph.D. identified the fragments as human bone, sex and race unable to be determined. She stated that the bone exhibited characteristics of burning at a temperature in excess of 1,200 degrees F, which is entirely consistent with modern cremation.

California law (Health and Safety Code Section 7054(a)) makes it illegal to dispose of cremated remains by any means other than internment in a cemetery; burial at sea; or kept in a home, church or religious shrine. Notwithstanding this law, during the public comment period for the November, 1996 Draft EIS/EIR, members of the general public stated that they had personal knowledge of non-Indian cremains being scattered in the vicinity of the Project area. The cremated bone fragments found in April, 1997 are consistent with being deposited by one of these individuals.

KEA has evaluated the significance of each of the cultural resources encountered during the survey (see Appendix L). None of the nine (9) isolates meet the NRHP criteria. Of the 88 prehistoric and historic sites, 28 do not meet the NRHP criteria. Sites evaluated as not eligible generally have low information potential, are not clearly associated with significant events or individuals, and are not noted as being of particular traditional cultural concern (see Section 3.6.2.4). Typically evaluated as not eligible are small lithic scatters, sparse scatters of historic refuse, non-traditional rock features (various rock alignments or cairns that do not conform to known Native American types and appear to be recent constructions), historic period trails, and isolated World War II-era features.

Fifty-five (55) sites are evaluated as eligible for the NRHP. The large multi-component sites in the Project mine and process area and Project ancillary area are evaluated as eligible because they contain information relevant to a variety of regional research questions (see Appendix L), and because of their cultural significance to the Quechan Tribe (see Section 3.6.2.4). They include features that are prime examples of a type of prehistoric construction (geoglyphs, rock circles, trails, and cleared circles) and are associated with important events in Quechan history. Prehistoric trails

are generally evaluated as eligible for their informational value in reconstructing trail networks and tracing how these were altered over time. These trails also have strong cultural significance to the Quechan Tribe as examples of tribal history. Geoglyphs are evaluated as eligible for informational value in reconstructing prehistoric belief systems and as prime examples of prehistoric construction. Ceramic scatters are evaluated as eligible because of the information they contain on changing patterns of Native American utilization of the desert and because of their utility in addressing issues of prehistoric ceramic typology. One (1) historic site was evaluated as eligible. Camp Pilot Knob was closely associated with General Patton's famous desert training exercises and retains numerous archaeological features with good integrity. These features would be useful in reconstructing daily camp life and in commemorating the war preparation efforts of thousands of soldiers. Camp Pilot Knob also encompasses three prehistoric geoglyphs, and these features are evaluated as contributing to the eligibility of the site.

Five (5) linear sites have not been evaluated. Three (3) are trails of undetermined date (prehistoric/historic), two (2) of which have historic components in association. The two (2) remaining sites are historic features, a water pipeline and a historic trail, which cross the overbuilt 92 kV/34.5 kV transmission line corridor, have not been evaluated. They appear to be associated with the mining town site of Hedges, which has been evaluated as eligible for the NRHP. However, the overbuilt 92 kV/34.5 kV transmission line would not impact these features, and a full evaluation of their significance is not necessary.

3.6.2.4. Area of Traditional Cultural Concern

In addition to the archaeological and historical sites discussed above, an "area of traditional cultural concern" (ATCC) has been identified in the survey area. The ATCC encompasses the archaeological sites in the Project mine and process area and some sites in the Project ancillary area, but extends beyond the Project area, with a total length of approximately 8.2 miles. It is designated as the Indian Pass-Running Man ATCC. The potential boundaries of the Indian Pass-Running Man ATCC, which have been discussed with Quechan tribal members, are based on the distribution of extant Native American trail segments in the vicinity and on a high concentration of evidence of Native American religious practices, including geoglyths, broken quartz, broken pots, and cleared circles. The Indian Pass-Running Man ATCC averages about 2.5 miles in width and has a maximum width of 5.2 miles. Although the distribution of archaeological material helped in defining the Indian Pass-Running Man ATCC boundaries, the Indian Pass-Running Man ATCC exists somewhat independently of those materials in that religious activities are only partially represented by the presence of the archaeological remains.

The Indian Pass-Running Man ATCC is linked by an extensive Native American trail system to several other locations of high religious and cultural significance to the Quechan. These trails have cultural value in their own right, and major trail systems converge in the Indian Pass-Running Man ATCC. Another of the properties that make this area special to Native Americans is the expansive view available from much of the Indian Pass-Running Man ATCC, particularly in the direction of

Picacho Basin and Picacho Peak, two other areas of traditional cultural significance. The Quechan say that the area is a place of solitude where religious practitioners came to seek knowledge and spiritual power. According to knowledgeable Quechan representatives, the area was the first of a series of four areas that a religious practitioner must encounter and learn from in his spiritual quest. The Quechan plan to use the Indian Pass-Running Man ATCC in the future for religious and cultural education.

Because the Indian Pass-Running Man ATCC is linked to other potential areas of traditional cultural concern through a culturally important trail system, final boundary determinations for purposes of evaluating the area as a "traditional cultural property" (TCP) in accordance with National Register Bulletin No. 38 has not been possible to date. The data are insufficient to determine whether the Indian Pass-Running Man ATCC should stand alone as a potential TCP, or should be evaluated as part of a larger complex that encompasses other areas of traditional cultural concern and connecting trails. Regardless, the evidence is clear that the Indian Pass-Running Man ATCC should be treated as a significant resource.

The Indian Pass-Running Man ATCC has been evaluated as eligible for the NRHP in accordance with Department of the Interior guidelines found in National Register Bulletin No. 38 (Parker and King 1992). It is associated with important events in Quechan history; it embodies distinctive characteristics of Quechan religious structures and/or built objects, such as geoglyphs, petroglyphs, and cleared circles; and its various components combine to create a unique and distinguishable entity that is held in very high regard by the Quechan Tribe. The Indian Pass-Running Man ATCC also retains a high degree of integrity. Indian Pass Road, which is unpaved, represents the single greatest intrusion, but the road cannot be seen from much of the Indian Pass-Running Man ATCC area and traffic during most times is very light. Views are generally unspoiled by modern intrusions. Many trail segments remain intact and retain close integrity of association with pot drops and certain rock features. In sum, the values that make the Indian Pass-Running Man ATCC eligible for the NRHP have not been severely impacted by existing modern development.

The Quechan have also expressed strong cultural concerns for the Trail of Dreams, a Native American trail that passes through the Indian Pass-Running Man ATCC. This trail links Pilot Knob to Newberry Mountain, two (2) highly important places in Quechan traditional cultural beliefs. The ability to travel along this trail, both physically and spiritually, is very important in Quechan religious beliefs, and the Quechan are highly concerned that the Project will cut-off their ability to use the Trail of Dreams for traditional cultural purposes.

3.6.3. Paleontological Resources

No paleontological resources have been identified within the area of the Proposed Action, and none are expected to be found. This is primarily because the metamorphic and igneous origin of the bedrock units found in the area essentially preclude paleontological resources in these units. Similarly, the cemented alluvial material overlying the area is too young to contain substantial

paleontological resources, and was deposited in such a high energy environment that it would not be expected to contain such resources.

3.7. Visual Resources

3.7.1. Regulatory Framework

Scenic quality is a measure of the visual appeal of a parcel of land. Section 102(a)(8) of the Federal Land Policy and Management Act of 1976 (FLPMA) placed an emphasis on the protection of the quality of scenic resources on public lands. Section 101(b) of the National Environmental Policy Act (NEPA) of 1969 required that measures be taken to ensure that aesthetically pleasing surroundings be retained for all Americans.

To ensure that these objectives are met, the BLM devised the Visual Resource Management (VRM) System. The VRM System provides a means to identify visual values; establish objectives for managing these values; and provide information to evaluate the visual effects of proposed projects. The inventory of visual values combines evaluations of scenic quality, sensitivity levels, and distance zones to establish visual resource inventory classes, which are "informational in nature and provide the basis for considering visual values in the [land use planning process]. They do not establish management direction and should not be used as a basis for constraining or limiting surface disturbing activities" (BLM 1986b).

Visual resource management classes are typically assigned to public land units through the use of the visual resource inventory classes in the BLM's land use planning process. One (1) of four (4) visual resource management classes is assigned to each unit of public lands. The specific objectives of each of the visual resource management classes are presented in Table 3.13.

The Project area is located within the California Desert Conservation Area (CDCA), which was created by FLPMA in recognition of the unique management requirements of the California Desert (see Section 3.9.1). The BLM's CDCA Plan has assigned one (1) of four (4) multiple use class designations to each unit of BLM-administered public lands within the CDCA. The Project area is designated as Class L - Limited Use. In the CDCA, visual resource management objectives are generally based upon the guidelines associated with each of the multiple use classes. Areas designated as Class L are generally managed to VRM Class II visual resource management objectives (Personal Communication, Tim Finger, BLM El Centro Resource Area, October 27, 1997).

Table 3.13: BLM Visual Resource Management Classes

Class	Description
I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant nature features of the characteristic landscape.
III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the character should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic element.

Source: BLM 1986b

3.7.2. Existing Visual Resources

The Project area landscape consists of a series of gently rolling ridge lines and upland areas interspersed with a series of slightly incised subparallel ephemeral drainage channels which all gently slope from north-northeast to south-southwest at approximately one (1) percent. The Project area is relatively undisturbed, with only a few roads and trails and minor disturbances from historic and ongoing mineral exploration activities. The upland areas support a sparse creosote bush scrub plant community, dominated by creosote bush (*Larrea tridentata*), ocotillo (*Fouquieria splendens*), and small numbers of desert shrubs and forbs. The ephemeral stream channels and the adjacent areas are dominated by a sparse community of desert ironwood (*Olneya tesota*), palo verde (*Cercidium floridum*), cat claw (*Acacia greggii*), burrobush (*Ambrosia dumosa*), brittle-bush (*Encelia farinosa*), with a few other desert shrubs and forbs. Much of the upland areas are covered by well-developed desert pavement of gravel- to cobble-size rocks.

The landscape color consists principally of browns, tans, and grays, while vegetation colors are generally browns, greens, yellows, and tans. Because of the sparse vegetation cover, the existing landscape colors meld with vegetation colors from distant points.

The visual resources of the Project area were evaluated using the methods outlined in Section 8431 - Visual Resource Contrast Rating of the BLM VRM Manual (BLM 1986a). The contrast rating system is a planning and design guide which is used to assess the degree to which a proposed project

contrasts with the existing visual character of the project area. It is used to identify visual impacts of proposed management activities and to identify mitigation measures which can be taken to reduce the identified visual impacts resulting from discordant project features (BLM 1986a).

Contrast ratings for the Project area were determined from four (4) viewing locations, known as Key Observation Points (KOPs), which were selected as representative of the possible views of the Project area. The selected KOPs, as shown in Figure 3.18, were: from Ogilby Road, at the 45 degree turn to the northwest located approximately four (4) miles southwest of the Project mine and process area (KOP #1); from a point near the telecommunication stations atop Black Mountain, approximately five (5) miles northwest of the Project mine and process area (KOP #2); from a hilltop just south of Indian Pass in the Picacho Peak Wilderness Area, approximately two (2) miles northeast of the Project mine and process area (KOP #3); and from an informal overnight camping spot adjacent to Indian Pass Road, approximately two (2) miles southwest of the Project mine and process area (KOP #4). The visual contrast rating for the Project mine and process area from each of the KOPs was completed using the Visual Contrast Rating Worksheet (Bureau Form 8400-4). The completed worksheets are attached as Appendix M.

Portions of the Project mine and process area are potentially visible only from a short section of Ogilby Road, at the point where the road turns to the northwest approximately four (4) miles southwest of the Project mine and process area (KOP #1). Views of the Project mine and process area from other portions of Ogilby Road are blocked, either by slightly elevated topography or by dense vegetation located adjacent to Ogilby Road. Persons viewing the Project mine and process area from this point, KOP #1, would currently view a landscape which has flat form and an undulating line in the middleground and a rhomboid form and angular to jagged line in the background (see Figure 4.2). The middleground texture is smooth with a tan to gray color. The background texture is smooth to rough with a brown to tan color.

The entire Project area is visible from elevated vantage points on Black Mountain, approximately five (5) miles to the northwest of the Project mine and process area. Persons viewing the Project mine and process area from the southern end of the top of Black Mountain (KOP #2) would currently see a landscape which has a flat, smooth-to-simple form and a flowing to weak line in the middleground, and a steep, smooth-to-simple form and geometric-to-soft line in the nearground (see Figure 4.4). The middleground texture is striped to directional with a gray to brown color. The nearground texture is granular to patchy with a black to brown color.

The entire Project area is also visible from the most elevated vantage points within the recently created Picacho Peak Wilderness Area, including the hilltop immediately south of Indian Pass and Indian Pass Road, approximately two (2) miles northeast of the Project mine and process area. Persons viewing the Project mine and process area from this point (KOP #3) would view a landscape which has a flat, smooth-to-minor rolling form and an undulating-to-irregular line (see Figure 4.6). The texture is granular, sparse-to-patchy with a tan, brown to black color.

The Project mine and process area is also partially visible from portions of Indian Pass Road, especially as the road approaches the Project mine and process area itself. An informal overnight camping area adjacent to Indian Pass Road was selected as KOP #4 as it is a point where members of the public may have an extended view of the Project. KOP #4 is located approximately two (2) miles southwest of the Project mine and process area. Persons viewing the Project mine and process area from this point would currently view a landscape which has flat form and an undulating line in the middleground and a rhomboid form and angular-to-jagged line in the background (see Figure 4.8). The middleground texture is smooth with a tan to gray color. The background texture is smooth-to-rough with a brown to tan color.

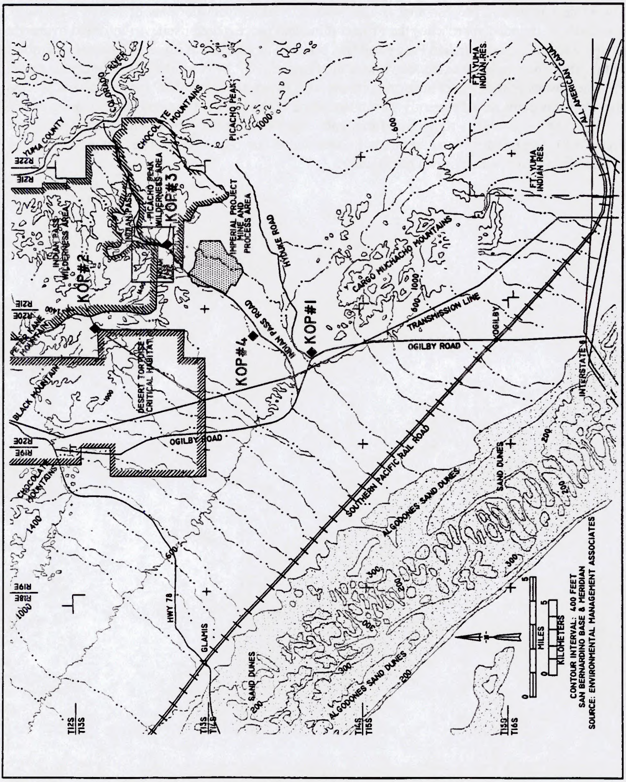

Figure 3.18: Location of Key Observation Points for Visual Evaluations

3.8. Noise

3.8.1. Regulatory Framework

The Noise Element of the Imperial County General Plan provides a program for incorporating noise issues into the land use and planning process, with a goal of minimizing adverse noise impacts to sensitive noise receptors. The Noise Element establishes goals, objectives and procedures to protect the public from noise intrusion. The Noise Element for Imperial County is applicable to lands owned or zoned by the county. However, lands regulated by the state or federal government, such as those within and surrounding the Project area, are preempted from local land use policy (County of Imperial 1993).

Noise is a form of energy that is generally described as unwanted sound. Noise levels, or sound pressure levels, are typically measured in units of A-weighted decibels [dB(A)] using a logarithmic scale which "frequency-weights" sounds within the audible range to approximate human hearing. Human hearing typically encompasses the sound range from approximately 5 dB(A) at the quietest end to approximately 140 dB(A), where pain is produced in most listeners.

3.8.2. Existing Noise Levels

Ambient noise level measurements for the Project area are not available. However, ambient noise levels in the Project area and vicinity are assumed low and typical of isolated desert areas (i.e., 35 to 50 dBA), except as may be modified by those noise generating activities in the Project area and vicinity, including:

- Traffic traversing Indian Pass Road through the Project area;
- Infrequent and intermittent military aircraft maneuvers and military weapons explosions associated with the use of the Chocolate Mountain Aerial Gunnery Range (CMAGR), located to the northwest of the Project area;
- Infrequent military aircraft overflights associated with Visual Flight Rule (VFR) corridors located above and adjacent to the Project area;
- Military helicopter use of the Project area as a training ground for the use of night vision devices;
- Noise associated with dispersed recreational activities, including: off-highway vehicle (OHV), hunting, and camping uses of the Project area and vicinity;
- Mineral exploration, including drilling by Glamis Imperial under existing BLM approvals; and
- Natural sources, such as wind, rain, thunder, and wildlife.

Sensitive noise receptors are, in general, those areas of human habitation or substantial use where the intrusion of noise has the potential to adversely impact the occupancy, use, or enjoyment of the environment. These can include residences, schools, hospitals, parks, and places of business requiring low levels of noise. Since the Project area is situated in a very remote area, there are no such typical sensitive human receptors in or anywhere near the Project area. There are temporary human receptors associated with the use of the Indian Pass recreation corridor, including the two (2) new wilderness areas, located within one-half (½) and one and one-half (1½) miles of the Project mine and process area (see Figure 3.15 and Section 3.9.2.1). However, sensitive noise receptors may also be defined to include potentially noise-sensitive wildlife, which may currently be present in or near the Project area (see Section 3.5.6).

3.9. Land Use

3.9.1. Regulatory Framework

Plans and policies applicable to the Proposed Action depend upon the agency responsible for managing the lands involved. For those lands under private ownership along the southernmost end of the overbuilt 92 kV/34.5 kV transmission line corridor, the applicable land management plans and policies include:

- The Imperial County General Plan
- Imperial County Zoning Regulations
- Southern California Association of Governments (SCAG) Regional Comprehensive Plan and Guide (RCPG.)

All of the remaining lands directly affected by the Proposed Action are public lands managed by the U.S. Bureau of Land Management; the applicable land management plan is the:

- BLM California Desert Conservation Area (CDCA) Plan

As Imperial County has no direct land use jurisdiction over public lands, neither the General Plan nor the Imperial County zoning regulations are directly applicable to activities proposed on public lands.

The state-mandated Imperial County General Plan (General Plan) was developed to create a balanced, comprehensive guide for future physical growth of lands within the County, and provides mechanisms to achieve the County's desired goals and objectives (County of Imperial 1993). The General Plan strives towards achieving a balance between development and economic, social, and environmental resources. The General Plan consists of nine (9) elements: Land Use, Housing, Circulation and Scenic Highways, Noise, Seismic and Public Safety, Agriculture, Conservation and Open Space, Geothermal and Transmission Resources, and Water Resources (County of Imperial 1993).

A Land Use Map is provided as part of the Land Use Element of the General Plan (Land Use Plan) which depicts projected land use development patterns within Imperial County. The Land Use Plan indicates that the entire area of the Proposed Action, including the southernmost portion of the overbuilt 92 kV/34.5 kV transmission line corridor, is located within a large expanse of land currently dedicated to open space/recreation uses.

Essentially all of those lands under private ownership along the southernmost end of the overbuilt 92 kV/34.5 kV transmission line corridor are also within the boundaries of the Felicity Specific Plan Area (County of Imperial 1993). The General Plan provides for the preparation and adoption of specific plans as "planning tools" to implement the general plan for further studies are needed prior to development. The Felicity Specific Plan Area is intended to be developed with a full range of residential, commercial, and light industrial uses in a manner which is compatible with the natural setting of the site and its visibility from Interstate Highway 8. The Felicity Specific Plan is currently under development by the ICPBD (Personal Communication, John L. Morrison, ICPBD, October 14, 1997).

Imperial County zoning and other land use regulations are designed to promote land use compatibility by designating acceptable uses and activities within identified areas or zones. Zoning regulations promote or prohibit uses, and designate appropriate building classes or structures within the various zones which are, in part, intended to prevent or inhibit conflicting or incompatible growth or uses within the respective zones. The Project area is currently zoned "S-Open Space."

The Conservation and Open Space Element of the Plan is concerned with mineral resources, open space and other environmental resources. The purpose of the Conservation and Open Space Element of the General Plan is to:

- Promote the protection, maintenance, and County's natural resources with particular emphasis on scarce resources and resources that require special control and management;
- Prevent the wasteful exploitation, destruction, and neglect of the State's natural resources;
- Recognize that natural resources must be maintained for their ecological value as well as for the direct benefit to the public; and
- Protect open space for the preservation of natural resources, the managed production of resources, outdoor recreation, and public health and safety.

In 1976, Congress enacted the Federal Land Policy and Management Act (FLPMA) and established the 25 million acre California Desert Conservation Area (CDCA). The CDCA Plan is a comprehensive, long range plan for the management, use, development, and protection of the 12 million acres of public land within the boundaries of the CDCA which are administered by the BLM. The CDCA Plan was adopted in 1980, and has been subsequently amended on a periodic

basis. The goal of the CDCA Plan is to provide and enhance uses for public lands without diminishing the environmental, cultural, and aesthetic values of these lands (USDI 1980).

The area of the Proposed Action is located entirely within the CDCA. The majority of the public lands within the CDCA have been designated under a multiple use classification system. Four (4) multiple use classes have been established: Class C (Controlled Use); Class L (Limited Use); Class M (Moderate Use); and Class I (Intensive Use). Specific guidelines have been established for each recognized activity in each multiple use class. All of the Project area, and approximately the northernmost mile of the overbuilt 92 kV/34.5 kV transmission line corridor, are located entirely in an area designated Class L, or Limited Use. Class L areas are intended to generally protect sensitive, natural, scenic, ecological, and cultural resources, and are typically managed to provide for generally lower-intensive, controlled, multiple use of resources, while ensuring that sensitive resources are not significantly reduced. Mineral exploration and development projects are allowed in Class L areas. All of the remainder of the overbuilt 92 kV/34.5 kV transmission line corridor (except for those public lands interspersed with the private lands near Interstate Highway 8, which are unclassified) is located entirely in an area designated Class M, or Moderate Use. Class M areas are intended to provide a controlled balance between higher intensity use and protection of public lands, and specifically provides for a wide variety of present and future uses, such as mining, livestock grazing, recreation, energy, and utility development.

The Southern California Association of Governments (SCAG) has adopted the Regional Comprehensive Plan and Guide (RCPG) as a guide for regional planning. The RCPG is divided into core chapters covering Growth Management, Regional Mobility, Air Quality, Hazardous Waste Management, and Water Quality, which constitute the base on which local governments ensure consistency of their plans with applicable regional plans under CEQA.

3.9.2. Existing Land Uses

The entire Project area is located within a remote area of eastern Imperial County on undeveloped public lands administered by the BLM. Current land uses in the area consist of mineral exploration and development, aerial military training overflights, utility corridors, and dispersed recreational activities by the general public. Similar public lands with similar uses generally surround the Project area. However, access to these similar lands off Indian Pass Road for recreational use by motorized vehicles is limited to designated trails. The nearest residence to the Project mine and process area is at Gold Rock Ranch, which is located approximately seven (7) miles southwest of the Project mine and process area. No other permanent residences are known to exist within ten (10) miles of the Project area.

Several operating mines are located in the vicinity of the Project mine and process area. The American Girl/Oro Cruz Mine is located about seven (7) miles south of the Project mine and process area; the Mesquite Mine is located about ten (10) miles to the northwest of the Project mine and

process area; and the Picacho Mine is located about eight (8) miles east of the Project mine and process area.

The U.S. Marine Corps (USMC) maintains the Chocolate Mountain Aerial Gunnery Range (CMAGR), which at its closest is approximately ten (10) miles northwest of the Project area. The CMAGR is actively used for military aircraft training and live ordnance delivery. The USMC conducts both daytime and nighttime helicopter flight training in and around the Project area, and two (2) military visual flight rule (VFR), low-level flying routes for fixed wing aircraft are located in the vicinity of the Project area (Personal Communication, T.A. Manfredi, USMC, June 2, 1995).

The BLM is currently drafting a long-term regional management plan which would include the Project area. The plan, entitled "Northern and Eastern Colorado Desert Coordinated Management Plan" (NECDMP), would address a broad spectrum of land uses which include mineral exploration and development as well as protection of biological resources. Plan decisions would involve only state and federal lands and would provide the basis for the BLM to amend its 1980 California Desert Conservation Area Plan (CDCA) and the cooperating agencies to update their land and resource management plans. An overview and progress report on the plan was published in July 1995 and addresses those comments received during the public scoping period. The scoping process has been completed and a draft plan is anticipated for release in 1998.

3.9.2.1. Wilderness Areas

The Wilderness Act of 1964 established the National Wilderness Preservation System which is comprised of public and other federal lands designated by Congress as wilderness. The California Desert Protection Act of 1994 gave wilderness designation to 69 individual areas of public land within the CDCA. Two (2) Wilderness Study Areas (WSAs) in the vicinity of the Project area, Picacho Peak (CDCA 355A) and Indian Pass (CDCA 355), were designated as wilderness areas (USDI 1995) (see Figure 3.14). The wilderness boundaries as shown in Figure 3.14 were set using legal descriptions drafted by the BLM from the maps adopted by Congress in 1994. The Picacho Peak Wilderness Area encompasses a total of approximately 7,700 acres, and is located approximately one-half (½) of a mile northeast of the Project mine and process area at its nearest point (USDI 1994). The Indian Pass Wilderness Area encompasses a total of approximately 33,855 acres within the Chocolate Mountains, and is located approximately one and one-half (1½) miles north of the Project mine and process area at its closest point. The southeastern boundary of the Indian Pass Wilderness Area is generally separated from the northwestern boundary of the Picacho Peak Wilderness Area by Indian Pass Road, which provides access to both of the wilderness areas from the southwest (USDI 1994).

3.9.2.2. Areas of Critical Environmental Concern

FLPMA defines an Area of Critical Environmental Concern (ACEC) as an area within public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; other natural systems or processes; or to protect human life and safety from natural hazards (USDI 1980). ACECs are managed for multiple use, but with special restrictions, and they do not preclude appropriate development if protection of sensitive values can be assured.

The Project area is not located within any designated ACEC. The nearest ACEC is the Indian Pass ACEC, located about three-quarters (3/4) of a mile north of the Project mine and process area at its closest point (see Figure 3.14). The Indian Pass ACEC was designated to protect cultural resources in the form of prehistoric artifacts located in the Chocolate Mountains approximately four (4) miles southeast of Quartz Peak. The only other ACEC located in the vicinity of the Project area is the Singer Geoglyphs ACEC, located about ten (10) miles west-northwest of the Project area. This ACEC was also nominated to protect cultural resources in the form of a number of intaglios located within that area.

3.9.2.3. Recreation Resources

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: provide additional information regarding recreational uses in the area, including recreational use of the wilderness areas.

Numerous dispersed recreational opportunities exist in the vicinity of the Project area. These uses include: hunting, camping, hiking, picnicking, rock collecting (rock hounding), photography, and off-highway vehicle (OHV) use. The nearest developed recreational facilities include the private Gold Rock Ranch, a small campground facility with a general store located approximately seven (7) miles southwest of the Project mine and process area, and the Picacho State Recreational Area, located about six (6) miles northeast of the Project mine and process area along the Colorado River. At this time, there is no known plan or proposal to incorporate the Project area or vicinity into either the state or federal park system.

Indian Pass Road serves as the primary access route to the new Indian Pass Wilderness Area and Picacho Peak Wilderness Area. The wilderness areas are likely to attract campers, rock collectors, and sightseers. Indian Pass Road also serves as a secondary route to the Picacho State Recreation Area, located approximately six (6) miles northeast of the Project mine and process area, and the road forms a loop with Picacho Road, circling back south to Interstate Highway 8.

Recreation resources in the Project area encompass an approximately one (1) to two (2) mile wide corridor parallel to Indian Pass Road (Indian Pass recreation corridor) from Ogilby Road to the Colorado River and the Picacho State Recreation Area. The Indian Pass recreation corridor is

considered an undeveloped, high use, recreational corridor. No improved campsites or facilities exist in the immediate area, but old fire rings and indirect evidence of primitive campsites were observed at locations along the wash west of Indian Pass Road between its intersection with Ogilby Road and the Project mine and process area. Many people drive through the area while going to the Colorado River and the Picacho State Recreation Area, and many people use the area as a vehicle tour route and may do some four-wheeling. People with both two-wheel and four-wheel drive vehicles come into the area and hike. The Indian Pass recreation corridor also provides informal overnight vehicle camping, especially in the microphyll woodland areas. People are attracted to the microphyll woodland areas because of the vegetation, hiking is easy in the washes, and the vegetation often attracts wildlife. Rock hounding is another popular recreational use in the area. During hunting season, the area is used by many hunters looking for deer, quail and mourning doves. Some people use the area for geology, natural history, and archaeology classes. There have also been some reports of World War II veterans returning to visit the area, which was used for some training exercises, and of the recent scattering of cremated human remains in the vicinity (Geisinger 1997). The BLM has been considering proposing Indian Pass Road as a "backcounty-byway" to promote vehicle access for "off-the-beaten-path"type of road use for the general public; however, no formal proposals have been made. Although the BLM does not have quantifiable use numbers for the Indian Pass recreation corridor, it is probably the most heavily used dispersed recreation area east of the intensely used Imperial Sand Dunes Recreation Area.

The Imperial Sand Dunes Recreation Area (ISDRA) is located approximately ten (10) miles west of the Project area in the Algodones Sand Dunes. The area south of State Route 78 is used for camping and off-highway vehicles (OHV), while the area north of State Route 78 is reserved for more passive recreational uses. The Imperial Sand Dunes Recreation Area is perhaps the most well known landmark in Imperial County and attracts thousands of off-highway (OHV) enthusiasts each year. The dunes extend for more than 40 miles along the eastern edge of the Imperial Valley and average approximately five (5) miles in width.

The D-12 deer hunt zone, which encompasses over 7,000 square miles in the eastern portions of San Bernardino, Riverside and Imperial Counties, including the Project area, has long been recognized by local hunters as providing valued desert deer hunting opportunities (Celentano and Garcia 1984). In recent years, hunting interest has increased, bringing additional pressures on the local deer population (Davis Schaefer 1995). The estimated total population of deer in the D-12 zone is 1,700 (CDFG 1996a); however, total deer population in the area is difficult to estimate and data is particularly expensive to obtain due to the low density and scattered distribution of the deer. As such, the herd size is typically discussed in relative terms based on climatic conditions, plant productivity, herd composition, and harvest data (Celentano and Garcia 1984). The CDFG recently compared the following methods for collecting deer data in the Sonoran desert: helicopter surveys, ground surveys, and hunter interviews. It was concluded that each of the three (3) methodologies provided generally comparable findings with respect to estimating the frequency of male, female, and juvenile mule deer within the survey area (Thompson and Bleich 1993). Based, in part, on these findings, the CDFG is currently using hunter surveys to provide demographic information about deer in the D-12 zone.

Hunter survey data for the D-12 deer hunt zone has now been collected for two (2) years (i.e., the 1994 and 1995 hunting seasons) (Personal Communication, Nancy Andrew, CDFG, 1996).

The voluntarily reported deer take in the D-12 zone in 1995 was 60 deer (CDFG 1996b). Using the estimated statewide average nonreporting of 49 percent, an additional 60± nonreported deer were probably also taken, for an estimated total of about 120 deer harvested within the D-12 zone. The Project area is located in Area IV of the D-12 zone (an area south of State Route 78 extending to the U.S.-Mexico border, and from the Colorado River west to the Imperial Valley). According to the two (2) recent deer hunter surveys compiled by the CDFG, a total of three (3) bucks were taken by the 26 hunters responding to the survey who hunted in Area IV during the 1994 season (approximately a 12 percent success rate); and a total of twelve (12) bucks were taken by the 29 hunters responding to the survey who hunted in Area IV in 1995 (about a 41 percent success rate). These survey numbers can be compared to the average hunter success rates statewide and the entire D-12 zone, including Area IV, over the past six (6) years (see Table 3.14). The CDFG expects to issue 1,100 deer tags for the 1996 hunt in the D-12 zone.

Table 3.14: Summary of Reported Deer Hunter Success Rates for Years 1990 - 1995

Area	Hunter Success Rates by Percent by Year					
	1990	1991	1992	1993	1994	1995
Statewide	14	12	12	10	11	8
D-12 Deer Hunt Zone	3	6	6	7	6	6

Source: CDFG 1996a

It is unclear from the information available if the reported higher relative success rate of hunters in Area IV is a result of an increasing population of deer resulting from consecutive years of favorable conditions (see Section 3.5.5), or other factors such as continuing increased OHV use and hunting pressure, as suggested by Celentano and Garcia (1984) to reflect the increased deer kill trend observed within the D-12 zone over the years 1945 to 1984.

Game birds, including Gambel's quail, mourning dove, and white-winged dove, inhabit the washes in the Project area. Relatively little statistical information is available regarding small game in the area, but it is reported that some hunters from the Imperial Valley favor hunting game birds in the desert washes over hunting these species within the Valley proper (Personal Communication, Carol Sassie, CDFG, 1996).

3.10. Socioeconomics

The Proposed Project would have an influence on the socioeconomic environment of both Imperial County, California and Yuma County, Arizona. Pertinent socioeconomic data and background data for both Yuma and Imperial Counties is summarized below.

3.10.1. Imperial County, California

Imperial County occupies an area of 4,284 square miles in the southeastern corner of California. It is bounded on the north by Riverside County, on the west by San Diego County, on the south by Mexico, and on the east by the Colorado River and Yuma County, Arizona.

3.10.1.1. Demographics

The Project area lies within a sparsely populated, unincorporated area of Imperial County. According to demographic statistics available from the State of California Department of Finance, Demographic Research Unit, Imperial County had a total population of 135,675 as of January 1, 1994 (California Department of Finance 1994).

The principal population centers located within California nearest the Project area are the City of Holtville, located approximately 50 road miles to the southwest; the City of Brawley, located approximately 56 road miles to the west-northwest; and the City of El Centro, located approximately 60 road miles to the southwest of the Project mine and process area. The estimated 1994 population for the cities of Holtville, Brawley, and El Centro were 5,576; 21,738; and 36,717; respectively (California Department of Finance 1994).

3.10.1.2. Housing

According to estimates based upon the 1990 U.S. Census, Imperial County was projected to have 40,366 households by 1994. The estimated number of persons per household in 1994 was projected to be 3.48 (California Department of Finance 1994).

3.10.1.3. Employment and Income

The labor force for Imperial County in 1994 was estimated by the State of California Economic Development Department to be 48,825. Per capita income in 1990 was estimated at $15,343 for residents of Imperial County. Median family income for 1990 was estimated at $25,147.

The local economy of Imperial County is based principally on agriculture, government services, and retail trade. According to 1990 estimates, 35.1 percent of the county's work force was employed in agriculture, 21.3 percent was employed in government services, and 15.2 percent were employed in

retail trade. Unemployment rates were estimated at 19.3 percent of the total work force of Imperial County in 1994.

3.10.2. Yuma County, Arizona

Yuma County occupies 5,509 square miles, and is situated in the far southwest corner of Arizona. Yuma County is bounded on the west by the Colorado River and Imperial County, California, on the north by La Paz County, on the east by Maricopa and Pima Counties, and on the south by Mexico. The City of Yuma is the county seat.

3.10.2.1. Demographics

Yuma County was projected to have a population of 120,827 in 1995 (Yuma Economic Development Corporation 1994). The City of Yuma in Yuma County, Arizona, approximately 30 road miles southeast of the Project area, is the nearest major population center to the Project area. The 1993 population of the City was estimated to be 57,730 (Yuma Economic Development Corporation 1994).

3.10.2.2. Housing

Yuma County was estimated to have 35,791 occupied housing units in 1990 (Arizona Public Service Company, Economic Development Department, and Azstats 1994). For the same period, the estimated number of persons per household was 2.9 (Yuma Economic Development Corporation 1994).

3.10.2.3. Employment and Income

The 1993 work force for Yuma County was estimated to be 45,300. The estimated 1992 per capita income for Yuma County was $12,504, and the 1990 median family income was estimated at $25,648 (Arizona Public Service Company, Economic Development Department, and Azstats 1994).

Yuma County's leading employers are agriculture, government, and tourism. The largest employers in Yuma County are the U.S. Marine Corps Air Station (MCAS) and Yuma Proving Grounds (Yuma Economic Development Corporation 1994). The estimated 1992 unemployment rate for Yuma County was 22.8 percent (Arizona Public Service Company, Economic Development Department, and Azstats 1994).

3.11. Roads and Public Services

3.11.1. Roads and Transportation System

Although the Project area is located in a relatively remote section of Imperial County, the existing road system provides direct access from the west. The Project mine and process area is located along Indian Pass Road, approximately five (5) miles northeast of the intersection of Indian Pass Road with Ogilby Road. Main access to Indian Pass Road and the Project area is via Ogilby Road, either from the south, approximately thirteen (13) miles from the Ogilby Road exit off Interstate Highway 8, or from the north, approximately eleven (11) miles from the intersection of Ogilby Road with State Route 78 (see Figure 3.18).

Indian Pass Road is an approximately 24-foot-wide, graded gravel road which provides access to Indian Pass and the southern Chocolate Mountains, Picacho State Recreation Area, and the recently created Indian Pass Wilderness Area and Picacho Peak Wilderness Areas, for campers, rockhounds, sightseers, and OHV users. Indian Pass Road is the primary access route between Ogilby Road and Picacho State Recreation Area. Indian Pass Road is maintained by the Imperial County Public Works Department (ICPWD), Road District No. 5, Holtville, under the general right-of-way granted by federal Revised Statute 2477 (R.S. 2477) on July 26, 1866, for public highways across public lands which were not otherwise reserved for any use. FLPMA rescinded R.S. 2477 in 1976, but no right-of-way under the FLPMA right-of-way regulations (43 CFR 2800) has been requested by Imperial County or granted by the BLM.

Hyduke Road is an approximately 15-foot-wide dirt road which extends from Ogilby Road to the Colorado River in the east. It provides access to the recently created Picacho Peak Wilderness Area and to the Picacho State Recreation Area Headquarters located along the western shoreline of the Colorado River, and is used by campers, rockhounds, sightseers, and OHVs. Hyduke Road is maintained by the BLM as a 4-wheel drive road.

Both Indian Pass Road and Hyduke Road are being considered for inclusion in the BLM's National Backcountry Byways program. This program is the BLM's contribution to the larger National Scenic Byways program, which is intended to increase the awareness of scenic corridors that are "off the beaten path" (USDI no date).

Ogilby Road (County Road S-34) is a two-lane, paved county road also maintained by the ICPWD. State Route 78, a paved two-lane state highway, and Interstate Highway 8, a four-lane interstate highway, are both maintained by District 11 of the California Department of Transportation (Caltrans).

Traffic volume counts [average weekday vehicle trip ends (AWVTE)] were taken in 1993 on several roads in the vicinity of the Project area, although no traffic volume counts on Ogilby Road in the

vicinity of Indian Pass Road, or on Indian Pass Road itself, were taken. The available counts are given in Table 3.15.

Table 3.15: Traffic Volume Counts on Roads in the Vicinity of the Project Area

Location	AWVTE
Interstate Highway 8 between Gordon's Well Road and Ogilby Road	10,000
Interstate Highway 8 between Pilot Knob Road and Ogilby Road	10,300
Ogilby Road just south of its crossing of the Southern Pacific railroad tracks	928
State Route 78 between Glamis Road and Ogilby Road	1,500
State Route 78 at Palo Verde Ave. in Palo Verde	1,550

Source: Personal Communication, Neil Jorgensen, ICPWD, November 1995

All public lands are classified by the BLM within one (1) of three (3) vehicle use categories: open, closed, or limited (BLM No Date). The Project area and surrounding areas are designated as Limited Use Areas. Limited Use Areas are those areas which are available for motorized vehicle use subject to certain restrictions. Within Limited Use Areas, routes of travel are further designated as either open, closed, or limited. Vehicle access within Limited Use Areas are restricted to open and limited approved routes of travel. Figure 2.8 shows the routes of travel within the Project area and vicinity (BLM No Date). All routes associated with Project activities within the Project area were either pre-existing or were contained in an approved Plan of Operations.

The main line of the Southern Pacific Railroad operates in the vicinity of the Project area. The rail line crosses Ogilby Road at a point approximately nine (9) miles south of the intersection of Ogilby Road with Indian Pass Road, and approximately 3.7 miles north of Interstate Highway 8. The Ogilby Road railroad track crossing is secured with standard crossing gates with flashing lights and warning bells (Personal Communication, Neil Jorgensen, ICPWD, November 1995).

3.11.2. Utilities

The Project area lies within the service area of the Imperial Irrigation District (IID), a state-chartered municipal utility which provides electrical energy to nearly all of the residential, commercial, and industrial users within Imperial County and southeastern Riverside County. The IID electrical service line nearest the Project area is a 34.5 kV transmission/distribution line which crosses Indian Pass Road just northeast of its intersection with Ogilby Road (see Figure 3.15). This transmission line transmits power from the higher voltage IID transmission lines in the south to the telecommunications equipment located atop Black Mountain. The IID has indicated that this 34.5 kV

transmission line has insufficient capacity to supply the electrical requirements of the Project (see Section 2.3.1.6). A Western Area Power Authority (WAPA) 161 kV transmission line runs parallel and immediately adjacent to the IID 34.5 kV transmission line; however, WAPA has determined that it could not provide the Project with "firm," or non-discretionary, capacity to transmit the required power to the Project from this transmission line.

Because of its strong agricultural base, Imperial County's economy is tied to the availability of inexpensive water. Most agricultural and potable water for use in Imperial County is supplied from the Colorado River by the IID via the All-American Canal. However, due to its remoteness, there is no public water service available to the Project area from the IID or others. Potable and process water for other projects located in the vicinity of the Project area is typically obtained from private wells.

Sewer district's are located in most of the cities and unincorporated population centers of Imperial County and Yuma, although no sewer district covers the Project area. Sanitary waste treatment for areas not within a sewer district is typically handled by individual on-site septic tanks and leaching systems in accordance with Imperial County Health Department regulations.

Natural gas is available in many parts of Imperial County and Yuma County; however, there are no gas lines in the vicinity of the Project area, and natural gas service is not available. Propane supplied from individual tanks is readily available from several suppliers in Imperial County and Yuma County.

Telephone service is not currently available to the Project mine and process area. The operating mines in the vicinity of the Project either have telephone service from Pacific Bell or operate an on-site microwave telephone system. Additionally, field communications for the Project would be provided by a FM mine communication system. The microwave and FM communications used by the Project would be regulated by the FCC. Both of these systems are outside the communications band used by the military.

As of 1993, there were ten (10) Imperial County-operated Class III disposal sites located throughout Imperial County which were authorized to accept non-hazardous solid waste (County of Imperial 1993). Three (3) of these landfills were located on land owned by Imperial County; six (6) were operated by Imperial County on public lands managed by the BLM; and one (1) was located on the Fort Yuma Indian Reservation. In addition to these facilities, one (1) privately operated public Class III waste disposal site was located in an unincorporated area northwest of the City of Imperial; one (1) privately operated public Class I landfill facility authorized to accept specific hazardous wastes was located west of the City of Westmorland; and one (1) private Class II solid waste disposal/storage facility authorized to accept designated waste was located northwest of the City of Westmorland (County of Imperial 1993).

3.11.3. Public Services

Police service for the Project area is provided by the Imperial County Sheriff's Department, which maintains a substation in Winterhaven, California, an unincorporated community located across the Colorado River from the City of Yuma, Arizona, and approximately 28 road miles from the Project mine and process area. Fire service for the Project area is provided by the Winterhaven Fire Department.

The nearest hospital to the Project area is the Yuma Regional Medical Center, located within the City of Yuma, Arizona, a distance of approximately 30 road miles from the Project mine and process area. The El Centro Regional Medical Center is located approximately 60 road miles from the Project mine and process area.

Imperial County's education system consists of eighteen (18) school districts which contain 37 elementary schools, seven (7) high schools, six (6) adult schools, one (1) community college (Imperial Valley College) and one (1) satellite campus of San Diego State University (County of Imperial 1993). Yuma County contains 24 elementary schools, four (4) high schools, four (4) private and parochial schools, and one (1) community college (Arizona Western College). Public school enrollment in Yuma County is approximately 24,250 students. An additional 500 students are enrolled in private and parochial schools (Yuma Economic Development Corporation, 1994).

3.12. Other Resources

The Project area is not in or adjacent to an area of prime or unique farmland or a designated wild, scenic, or recreational river.

4. ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

4. ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

4.1. Proposed Action

4.1.1. Geology and Mineral Resources

4.1.1.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Expose people or structures to major geologic hazards; or
- Substantially restrict the future ability to utilize mineral resources.

4.1.1.2. Impacts of the Proposed Action

Slope Stability and Seismic Effects:

Seismic review of regional faults (active and potentially active) has indicated maximum credible earthquake magnitudes of 5.8 to 7.5 (see Table 4.1). However, because of the distance from each of these faults to the Project mine and process area; the nature of the underlying geologic units; and the depth to ground water; regional seismicity is not expected to cause substantial horizontal accelerations or extensive ground shaking within the Project area.

The proposed slope configurations for the leach pad ore heap (2H:1V, including benches) are similar to those used at nearby mining operations, at which no substantial slumping or slope failure has occurred. Stability analyses completed for the planned heaps and waste rock stockpiles (WESTEC, Inc. 1996b) also indicate that the proposed slope of the heap and waste rock stockpiles would be stable and unlikely to produce substantial failures, including landslides, either under normal operating conditions or from ground shaking during regional seismic events.

Preliminary pit slope recommendations prepared for the East Pit and West Pit contained slope angles ranging from 40° to 55°, with circular failure and/or non-daylighting wedge failure potential within the pits controlling most of the slope angles (WESTEC, Inc. 1997). Experience at nearby mines indicates that the proposed final pit wall slope of 1H:1.2V (50 degrees), constructed in cemented alluvium/gravels and metamorphic rock, would provide the required factor of safety for long-term slope stability, including the vibrations from blasting and ground shaking from anticipated seismic

events in the region. The proposed pit wall design includes safety benches at regular vertical intervals to contain minor rock falls. The waste rock stockpile slope configurations would also be similar to those used at the Picacho Mine. No substantial slumping or slope failure is anticipated; however, the preliminary pit slope report recommended re-evaluation once mining operations commenced and more data was available.

Table 4.1: Summary of Maximum Probable Seismic Events and Effects

Fault or Fault Zone	Distance and Direction from Project Area (miles/direction)	Maximum Probable Magnitude	Effects at Project Area	
			Maximum Probable Peak Acceleration (g)[a]	Duration of Strong Ground Shaking (seconds)
East Mesa	29/West	6.0	0.17	18
East Highline Canal Lineament	32/West	6.0	0.09	18
Imperial/Brawley	42/Southwest	6.8	0.07	24
Brawley Seismic Zone	44/West	5.8	0.04	18
Superstition Hills	55/West	7.0	0.05	30
San Andreas	63/Northwest	7.5	0.04	36
Elsinore	77/Southwest	7.0	0.03	30

[a]Source: Joyner and Fumal 1986 (In: Environmental Solutions, Inc. 1993b.)

Because of the great depth to ground water, and the design of the heap leach pad, which prevents the accumulation of standing water within the heap, there is very little potential for any liquifaction, and no significant effects are anticipated.

Project structures would be designed and constructed subject to the current Uniform Building Code (UBC) Seismic Zone 4 standards, which are the most stringent in the UBC. Implementation of Seismic Zone 4 standards would conform to the current Building Code Requirements of the Imperial County Planning/Building Department, and prevent catastrophic failure of facilities which could endanger human life during seismic events. Therefore, impacts to Project facilities from remote seismic events would not be significant.

No surface ruptures are anticipated from seismic activity because there are no known or currently identified active faults within the Project area. Mining of the proposed pits would not be expected to affect either the physical geology of known faults in the region or regional seismicity. No significant effects are anticipated.

Subsidence:

No land surface subsidence due to the extraction of ground water from the ground water production wells is expected. Generally, land surface subsidence related to ground water extraction occurs only when the drawdown of the ground water table is large or results in a substantial pressure reduction

in a confined aquifer; or a substantial percentage of the earth materials forming the aquifer are fine-grained (silts or clays); or the depth from the surface of the land to the water table is small. Because the amount of ground water the Project proposes to extract is not large compared to the size of the aquifer or the amount of water in storage (see Section 4.1.3.2.2); because the sediments in the ground water production area are relatively coarse alluvial materials; and because the depth to ground water is greater than 500 feet below ground surface (bgs), measurable subsidence is not expected to occur as a result of the production of ground water. If subsidence were to occur, it would be localized and not adversely affect any Project facilities or natural or other man-made features. The wells, water pipeline, and electrical transmission and distribution lines can each tolerate localized subsidence. There are also no other existing or planned developments or natural features in the immediate vicinity of the ground water production wells which could be adversely affected by localized subsidence. Thus, the impact of any subsidence which may occur would be below the level of significance.

Naturally Occurring Radioactive Materials:

Materials to be mined by the Project have not been analyzed for naturally occurring radioactive materials (NORM). However, some analyses from the general area for radon gas and uranium and thorium in soils have been conducted and can be used as an indication of the relative amount of NORM in the Project mine and process area. In 1990 the California Department of Health Services (CDHS) conducted an initial phase radon survey by placing short-term radon detectors in approximately 2,858 randomly selected homes (CDHS 1990). Two samples were collected from homes in the Brawley area of Imperial Valley, the results of which indicated radon isotope-222 levels of 1.8 and 1.1 picocuries per liter (pCi/l) of air. These values are substantially below the USEPA recommended level of 4.0 pCi/l at which action should be taken to reduce radon levels. The mining of the proposed West Pit, Singer Pit, and East Pit is not expected to substantially increase the release of naturally occurring radon gas into the atmosphere.

Within an approximately fifteen (15)-mile radius of the Project mine and process area, approximately 37 soil samples were collected as part of the national uranium resource evaluation (NURE) (Hoffman, et al. 1991). The uranium values from these soil samples range from 2.2 to 4.4 ppm, and average 3.0 ppm. The average crustal abundance of uranium is 2.5 ppm (Rose, et al. 1979). The thorium values from the same soil samples range from 4.0 to 21.0 ppm, and average 10.67 ppm. The average crustal abundance of thorium is 10 ppm. In the immediate vicinity of the Project area, two (2) soil samples were collected. The uranium values from these two (2) soil samples are 2.2 and 3.0 ppm, which produce an average of 2.6 ppm. The thorium values from the same two (2) soil samples were 5.0 and 16.0 ppm, which produces an average of 10.5 ppm. Using the radon values in comparison to the USEPA recommended action level, and the uranium and thorium values in comparison to the average crustal abundance of those elements, neither the Project area nor the vicinity appears to have elevated levels of radioactive elements and, therefore, elevated NORM levels would not likely be expected to be produced by operations within the Project mine and process area. These impacts would be below the level of significance.

Loss of Mineral Potential:

Condemnation drilling by Glamis Imperial geologists has been used to determine the limits of the gold ore bodies within the Project mine and process area. The results of this drilling, to date, indicate that valuable mineral resources common to the Project mine and process area do not exist in the areas of the proposed heap pad, waste rock stockpiles, and the process and ancillary facilities. Therefore, no potentially valuable mineralization would be buried by the placement of these facilities in these areas.

Backfilling of the West Pit would result in the burial, and thus likely loss, of some mineral resources since there is some mineralization at the bottom of the West Pit which would not be mined under the Proposed Action. However, as shown in Figure 3.2, this mineralization is dipping steeply to the west, and any mining would produce substantially greater quantities of waste rock per ton of ore than is currently economic under the Proposed Action. Thus, mining of this mineralization is very unlikely to ever be economic, and its loss would not be significant.

Some mineralization would also be left in some locations at the bottom of the East Pit following the completion of mining under the Proposed Action. Since the East Pit would only be partially backfilled, if necessary, to the level needed to raise the floor to the predicted level of any pit lake, the costs of mining this mineralization below the current limits of the Proposed Action under some future Plan of Operations would increase only slightly over that of leaving the East Pit completely open. This decrease in the economic value of the mineralization in the East Pit from partially backfilling would not be significant.

4.1.1.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.1-1: Heap leach pad and waste rock stockpile slopes shall be constructed at overall slopes no steeper than 2H:1V.

- 4.1.1-2: Mine pit slopes shall be constructed at overall slopes no steeper than 1H:1.2V (50 degrees) unless mining conditions and geotechnical factors demonstrate through engineering analysis that steeper slopes would be safe, and such steeper slopes shall be approved by the BLM. Slopes shall not be steeper than is safe considering actual rock strength and structural

conditions encountered. Pit slope angles in the West Pit and East Pit shall be re-evaluated after one (1) year of mining of that pit.

- 4.1.1-3: Approximately 40-foot wide benches shall be constructed at approximately 80-foot high intervals on mine pit slopes to catch loose rocks. Approval shall be obtained from the BLM prior to construction of mine pit benches which differ substantially from these specifications.

- 4.1.1-4: To avoid any substantial slumping or slope failure of the heap and waste rock stockpile slopes, the recommendations of the slope stability analyses of these facilities shall be followed during the construction of these facilities.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.1-5: Project structures subject to the Uniform Building Code shall be designed and constructed consistent with the standards of Seismic Zone 4.

Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts:

No mitigation measures are proposed or recommended.

4.1.1.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

There would be no unavoidable adverse effects to geology from implementation of the Proposed Action. The goal of the Proposed Action is to mine precious metal mineral resources for beneficial use.

The effects of the Proposed Action on geology or mineral resources would be below levels of significance.

4.1.2. Soil Resources

4.1.2.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Cause substantial erosion.

4.1.2.2. Impacts of the Proposed Action

Approximately 1,302 acres would be disturbed within the Project mine and process area, 38 acres within the Project ancillary area, and 22 acres within the overbuilt 92 kV/34.5 kV transmission line corridor as part of the Proposed Action. Soils within the Project mine and process area are poorly-developed gravelly sands, and only a thin covering of soil is present for Project reclamation and revegetation. Approximately 112,200 cubic yards of soil would be salvaged from all washes and areas where sufficient soil development is noted. Soils would be salvaged to the greatest depth practicable (generally 12 to 18 inches) and stockpiled for later use during reclamation activities. Soils would be stockpiled at two (2) proposed sites within the Project mine and process area (see Figure 2.2). The soil stockpiles would be clearly identified with signs to assure that the material was not misidentified as waste rock material. The gravelly nature of the soils would minimize erosion by wind and rain.

Many of the soils in the Project area, and many of the Project facilities themselves (such as the soil stockpiles, waste rock stockpiles, and heap, etc.), may be subject to erosion, either from precipitation falling directly within the Project area or from flow events in the ephemeral washes. To minimize erosion, Glamis Imperial has indicated that all Project facilities (including the heap leach facility, waste rock stockpiles, soil stockpiles, and roads) would be designed and constructed with erosion control features engineered to meet the performance standards at 14 CCR 3706 (see Section 2.1.11.2.3). The Project would also be required to be constructed and operated in accordance with a Storm Water Pollution Prevention Plan (SWPPP), which requires the use of Best Management Practices for erosion control, in accordance with the California Storm Water National Pollution Discharge Elimination System (Storm Water NPDES) permit program (California Water Code Section 13000 *et seq.*).

Surface runoff and drainage from disturbed areas within the Project mine and process area would be controlled, collected, conveyed to sediment basins, and infiltrated (or consumed in the mining or heap leach process). Any areas which might be susceptible to erosion from surface flows would be protected through the use of berms, sediment ponds, rip rap, check dams composed of sand bags, silt fences, or other techniques to prevent erosion and potential damage. These erosion control features would be in areas currently proposed for disturbance. Erosion control methods would be designed to handle at least a 20-year/1-hour intensity storm event, in accordance with standards established by 14 CCR 3706(d) (SMARA regulations). Modifications to the erosion control methods would be made as necessary over the life of the Project. As a result, substantial erosion would not be created and the impacts of erosion would not be significant.

Several ephemeral drainages would be permanently diverted around the Project facilities within the Project mine and process area. Rip rap would be placed along the channel banks to prevent erosion. Each diversion would channel the flow into the same major wash, or into another existing wash which was tributary to the same major wash, thus putting all flow back into the same drainage system. Diversion channels would also be built to approximate the original drainage system in both

gradient and channel geometry, and would be designed to convey all runoff flows from the 100-year 24-hour, 100-year 6-hour, and 500-year 24-hour precipitation events. This would minimize changes in the hydraulic characteristics of the channel and minimize the potential to increase any erosion from the diversion of the wash. Erosion impacts from the diversion of the ephemeral stream channels would not be significant.

Because the washes which flow through the Project mine and process area continue downgradient to the southwest until each eventually ends in individual areas of infiltration on the eastern edge of the Algodones Sand Dunes (see Figure 3.18), there would be no impacts from erosion, sedimentation, or diversion of ephemeral stream channels on any areas outside of the "Indian Wash Drainage Basin," including the Fort Yuma Indian Reservation or the "Picacho Wash Drainage Basin" in which the Fort Yuma Indian Reservation sits.

Because of the minimal amount, depth, and length of time of the surface disturbance associated with activities to be conducted within the Project ancillary area and the overbuilt 92 kV/34.5 kV transmission line corridor, there is little chance of any substantial erosion. This would be a less-than-significant effect.

4.1.2.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.2-1: Surface disturbance shall be kept to the minimum that is required to construct and operate the project.

- 4.1.2-2: Soils shall be salvaged from all areas where sufficient soil development is noted in conformance with the approved Reclamation Plan. Soils shall be salvaged to the greatest depth practicable and placed in stockpiles clearly delineated with signs to assure the material is not mistaken as waste rock. Soil stockpiles shall be located away from washes and other areas prone to erosion and consolidated as appropriate to reduce disturbance to undisturbed areas within the Project mine and process area. Stockpiles shall be kept shallow and dry, if not to be used within one (1) year of initial placement, to protect seeds.

- 4.1.2-3: All mine facilities shall be designed and constructed with erosion control features engineered to meet the performance standards of 14 CCR 3706, including the control of runoff and protection of areas susceptible to erosion from surface flows.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.2-4: A Storm Water Pollution Prevention Plan, incorporating the use of Best Management Practices for erosion control, shall be developed and implemented in accordance with the California Storm Water NPDES permit program.

Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts:

No other mitigation measures are proposed or recommended.

4.1.2.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

Implementation of the Proposed Action would result in the unavoidable loss of those minor amounts of soils which cannot be salvaged during construction. Based upon regulatory requirements and mitigation measures that have been incorporated into the Project design, effects of the Proposed Action on soil resources would be below level of significance.

4.1.3. Hydrologic Resources

4.1.3.1. Surface Waters

4.1.3.1.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Substantially degrade water quality;
- Contaminate a public water supply;
- Cause substantial flooding or siltation; or
- Substantially alter surface flow conditions, patterns, or rates.

4.1.3.1.2. Impacts of the Proposed Action

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: include a discussion of flood zones; and add a new delineation of "waters of the United States" impacted by the Proposed Action.

Stream Flow Alterations:

The Proposed Action would include the diversion of segments of five (5) existing ephemeral watercourses, and the permanent filling or excavation of tributaries of these watercourses. All diversions divert water entering the Project mine and process area to other segments of these same washes, which then flow naturally through or around the Project mine and process area (see Figure 2.9).

Although these diversions result in a substantial alteration to surface water drainage patterns within the Project mine and process area, each diversion would channel the flow directly into another existing wash which was tributary to the same major watercourse. All other storm water surface flows entering the Project mine and process area which would not otherwise impact Project facilities would flow through the Project mine and process area. Each of the diversion channels has been designed to safely convey all runoff flows from the 100-year, 6-hour precipitation event, which satisfies the siting requirements for mining waste management units (23 CCR 2572(b)) and exceeds the recommended design values for diversions and drainage facilities around mining waste management units as prescribed in 23 CCR 2572(h)(1)(C). Because there is some potential for flash flooding from thunder storms, the diversion channels have also been designed with an additional "flood bench" area immediately adjacent to the main channel so that the channel and "flood bench" together can easily accommodate the 500-year, 24-hour storm flow (see Figure 2.10). Each of the diverted channels directs flows around the mining facilities and back into the same major drainage system from which it was diverted (see Figure 2.9). Thus, all flows would continue in the same channels outside of the Project mine and process area, and there would be no substantial alteration of stream flows or patterns outside of the Project mine and process area. The impacts resulting from these alterations are below the level of significance

Precipitation falling on undisturbed portions of the Project mine and process area would be allowed to collect and flow through the area as before construction of the Project. Precipitation falling within the open pit boundaries would collect on, or infiltrate through, pit floors, thus reducing potential storm water runoff from the Project compared to the existing desert floor. Precipitation falling on the heap leach pad or within the pregnant or barren ponds would also remain within this closed hydrologic system. Depending on the porosity and permeability of the mine facility and the intensity of the precipitation, storm water runoff may be delayed (such as from rain falling on the porous waste rock stockpiles) or accelerated (such as from the relatively impervious roads). Regardless of the effect, because the Project mine and process area facilities which may accelerate, delay, or "capture" precipitation are such a minor percentage of the overall surface area of the drainage basins in which they are located, only a very minor delay, acceleration, or reduction in storm water flow in the major washes downstream of the Project mine and process area would result from the Project activities. Minor, ephemeral tributaries which are truncated by certain Project facilities (such as the heap leach pad) would have a reduction on runoff flow, although this flow reduction is not considered substantial and therefore would not be significant.

Surface runoff and drainage resulting from precipitation falling on the waste rock stockpiles, soil stockpiles, or on project roads and other disturbed areas within the Project mine and process area would be controlled using a number of Best Management Practices (BMPs). Among the methods of control would be collection and detention in sediment basins. Evaporation and infiltration would occur in the sediment basins, further reducing the potential for downstream sedimentation. If excess water is captured, it may be utilized in the mining, dust control, or heap leach processes. Based on experience at the Picacho Mine, it is expected that insignificant quantities of storm water would leave the Project mine and process area. The specific details of storm water management would be documented in a SWPPP, which would be prepared after approval of the Project mine, and implemented when the facility begins operations. This SWPPP would be a public document maintained on the Project mine and process area. Storm water flows would not result in a significant impact.

Stream Sedimentation and Quality Degradation:

The principal throughgoing stream channels appear to be undergoing very little geomorphic change (EMA 1996a). There is a potential for the erosion of materials from the Project soil stockpiles, waste rock stockpiles, and other Project facilities into the washes due to overland storm flow or from erosion by flows in the washes themselves during major precipitation events. Substantial erosion of Project facilities could result in substantial discharge of sediment into the watercourses, which could lead to the deposition of substantial sediment in these watercourses downstream of the Project mine and process area, and which could damage or bury the vegetation in the washes. Areas most susceptible to erosion, and thus, the production of sediment, would be steep, loose, waste rock or soil stockpile slopes adjacent to the major throughgoing watercourses; the outside banks of major turns in the washes, and the "at grade" haul and maintenance road crossings of the major stream channels within the Project mine and process area (and the two (2) "at grade" crossings of the western-most wash adjacent to the Project mine and process area by the relocated Indian Pass Road).

Best management practices to reduce the potential for erosion have been incorporated into the Proposed Action (see Section 2.1.11.2.3 and Section 4.1.2.3) which would also substantially reduce the potential for sedimentation in the ephemeral stream channels. These include placing rip rap on the outside bends of diverted stream channels, providing setbacks of facilities (such as the waste rock stockpiles) from the banks of throughgoing washes, placing berms around facilities as appropriate, and installing sediment basins around the facility designed to capture run off from the 100-year, 24-hour storm event for the entire Project mine and process area. In addition, the heap benches and berms would be constructed to provide for 100 percent containment of the precipitation from the 1-hour probable maximum precipitation (PMP) design storm event. Since the Project would use process solutions that could potentially be harmful to human health and the environment during the 20-year proposed operating life, the use of the PMP design was selected as the most stringent, prudent and reasonable value, compared to the 100-year/24-hour event or other smaller precipitation event). The PMP was calculated to be 4.65" by averaging the PMP values for Yuma, Arizona and El Centro, California. A conservative value of 5" was used in the design. Utilizing this approach

would, under probable conditions, provide maximum protection to the environment from the escape of fluids from the heap leach facilities. Erosion control methods around facilities other than the heap leach would be designed to manage not less than a 20-year, 1-hour intensity storm event, in accordance with standards established by 14 CCR 3706(d) (SMARA regulations). The Proposed Action also includes compliance with the conditions of the Storm Water NPDES General Permit applicable to the Project, and preparation and compliance with the requirements of a Storm Water Pollution Prevention Plan (SWPPP) to control drainage and erosion. As a result, the Proposed Action is not anticipated to result in significant sedimentation.

Substantial quantities of various chemicals would be stored and used within the Project mine and process area (see Section 2.1.9.4), and substantial quantities of regulated waste (such as waste oil) would be generated (see Section 2.1.9.5). These materials could be released into the watercourses which flow through the Project area, either through spills directly into the washes or from overland flow of either the spilled material or contaminated soil. Minor spills of chemicals and regulated wastes may occur during the life of the Project, but would not result in any substantial degradation of surface water quality if promptly contained and collected and properly disposed of. Measures to reduce the potential for spills of chemicals or regulated waste have been included in the Proposed Action, which also includes sediment traps designed for the 100-year, 24-hour storm event to ensure no spilled material leaves the Project mine and process area, and measures to reduce erosion and sedimentation which may transport spilled materials or wastes to the watercourses. Together, these measures would reduce the potential for any surface water degradation to insignificance.

The heap leach pad system (heap, pad, ponds, etc.) would be designed to provide for 100-percent containment of the precipitation from the maximum probable one (1)-hour storm event occurring simultaneously with a 24-hour power outage while still maintaining a two-foot freeboard in the process and overflow ponds (see Section 2.1.8). This would reduce the potential for failure of the process facilities to contain all process solutions during high precipitation events, which might otherwise result in a discharge of process solution and sediment to the natural drainage channels. In addition, the waste characterization studies (EMA 1995; EMA 1996b) conducted on samples of waste rock and leached ore concludes that these materials are all properly classified as non-acid generating wastes, and that the leachates which may be formed from precipitation moving through the waste rock or leached ore would have very low concentrations of metals, which would not degrade the quality of surface waters. These effects would also be below the level of significance.

There is no evidence that implementation of the Proposed Action would result in any violations of any applicable state water quality standard, nor violate any applicable toxic effluent standard or prohibition.

Floodplain Encroachment

Pursuant to Sections 74400 through 74402 of Division 4 of Title 7 of the codified ordinances of Imperial County, a development permit is required to be obtained from the Flood Administrator

before construction or developments begins within any area of special flood hazard (such as FEMA Zone A, but not Zone C). Sections 74500 through 74501 of Division 4 of Title 7 of the codified ordinances of Imperial County proscribe the standards of construction and standards for utilities which are to be followed when constructing structures within these special hazard areas. Based upon a review of the FEMA FIRM map for the Project area, none of the facilities located within the Project mine and process area would encroach upon any areas designated Zone A, and only a small portion of the buried water pipeline in the Project ancillary area is proposed to be constructed through an area designated Zone A (that in the portion of Zone A which crosses Indian Pass Road) [see Figure 3.8]. Construction in this Zone A section would be subject to these Imperial County standards and would require authorization from the Imperial County Flood Administrator. This would not be a significant effect.

Compliance with Executive Order 11988 would require the BLM (and other federal agencies granting applicable rights) to reference in the granted right those uses, if any, that are restricted under identified federal, state or local floodplain regulations in any floodplain. This is not a significant effect.

Ground Water Inflows:

The West Pit and East Pit are predicted to intercept the local ground water table at elevations of 211 feet and 88 feet AMSL, respectively. Thus, the projected final pit floor elevation of both the East Pit and the West Pit would intersect ground water within the bedrock aquifer. Because of the low permeability and porosity of the bedrock below the ground water table, little ground water is expected to enter the pits. Hydrologic investigations conducted within the area of the proposed pits indicate that hydraulic conductivity in the bedrock is very low (WESTEC, Inc. 1996a); however; these data were calculated from falling head and slug tests and, as such, are of limited value in accurately determining aquifer parameters. Furthermore, information collected to date indicates that the flow of substantial amounts of ground water from the alluvium bedrock contact into the open pits is highly unlikely. This is supported by the fact that approximately 60 percent of the exploration holes drilled in and around the proposed pits have been drilled using dry methods, and only a trace of water has been detected at the alluvium/bedrock contacts (see also Figure 3.11 and Figure 3.12). Should ground water be encountered in the pits during mining operations, it would be utilized in dust control operations, or collected and used in process operations, thus reducing the amount of ground water which would need to be produced from the ground water wells and consumed.

After the cessation of mining activities, it is possible that ground water seepage, surface runon or direct precipitation may accumulate in the bottom of either the East Pit. Calculations based on projected ground water inflow to the pit, annual precipitation, and annual evaporation for the East Pit indicate that the estimated annual evaporation rate is approximately 170 times the annual estimated ground water and precipitation inflow rate (WESTEC, Inc. 1996a). Because the project pit inflow estimates are based on limited data, additional calculations using hydraulic conductivity values ten (10 times higher were made to evaluate possible higher inflows to the pit. These

calculations indicated that even in the event that inflow rates an order of magnitude greater than those expected based on existing data, annual evaporation would still exceed annual inflow (Personal Communication, John Heggeness, WESTEC, 1996). Thus, the formation of a pit lake in the bottom of the East Pit after the cessation of mining activities is not likely. The Proposed Action also proposes to conduct an assessment at the end of mining and to backfill the East Pit with waste rock to an elevation which would ensure that no standing water would remain in the pit bottom if the assessment indicates that there is a reasonable potential for a pit lake to form. This reduces the potential for the formation of a pit lake in the East Pit even further. (See also Section 4.1.3.2.2 for a discussion of the potential for the degradation of ground water quality as a result of evaporation and/or leaching of minerals from a pit lake, should it form.) The effects of any pit lake on ground water hydrology are less than significant. However, see Section 4.1.5.3.2 for a discussion of the potential adverse effects of a pit lake on wildlife.

The formation of localized moist areas, seasonal seeps, or ephemeral, localized ponds from ground water inflow, precipitation, or surface water runon, remains a possibility in the East Pit. The effects of these seeps on ground water hydrology are below the level of significance. However, see Section 4.1.5.2 for a discussion of the potential adverse effects of these seeps, etc. on vegetation and plant habitat.

Both the West Pit and the Singer Pit are proposed to be completely backfilled under the Proposed Action. However, if mining is suspended or terminated prior to backfilling of the West Pit above the ground water level, it is possible, but not probable, that a pit lake could form in the West Pit. Also, if mining is suspended or terminated prior to the complete backfilling of either the West Pit or the Singer Pit, formation of localized moist areas, seasonal seeps, or ephemeral, localized ponds from ground water inflow (for the West Pit only), precipitation, or surface water runon remains a possibility. These effects on ground water hydrology are below the level of significance. However, see Section 4.1.5.2 for a discussion of the potential adverse effects of these seeps, etc. on vegetation and plant habitat, and see Section 4.1.5.3.2 for a discussion of the potential adverse effects of a pit lake on wildlife.

<u>"Waters of the United States"</u>:

The delineation of "waters of the United States" conducted for the Project (see Section 3.3.1.4) determined that there were approximately 114.5 acres of jurisdictional "waters of the United States" within the Project mine and process area. An assessment of the acreage of "waters of the United States" which would be affected by discharges of dredged or fill material (that is, altered by excavation or the addition of material) by Project activities within the Project mine and process area has been completed (LSA Associates, Inc. 1997b [see Appendix N to this EIS/EIR]). By comparing the layout of the Project facilities within the Project mine and process area to the delineated "waters of the United States," it is estimated that approximately 77.4 acres of "waters of the United States" would be directly affected through the permanent filling or excavation of these "waters of the United States" within the Project mine and process (see Figure 4.1). Indirect impacts to other "waters of the

United States" would also occur, both within and immediately adjacent to the Project mine and process area, principally through the isolating or de-watering of a given reach of drainage course by excavating or filling upstream areas. However, such indirect impacts would be restricted to short reaches of tributary stream channels immediately down-gradient of the filled or excavated areas, since all of the major stream channels have been diverted to maintain throughgoing flows.

The draft alternatives analysis prepared under Section 401(b)(1) of the Clean Water Act (LSA 1997b) concludes that the Proposed Action is the least environmentally damaging practicable alternative. In addition, Section 3.3.1 of this EIS/EIR describes the hydrologic function, and Section 3.5 describes the ecosystem values, of the "waters of the United States" located within the Project mine and process area. Section 4.1.2.3, Section 4.1.3.1.3, and Section 4.1.5.4 of this EIS/EIR discuss the appropriate and practicable steps which should be taken to minimize potential adverse impacts of the discharge on these hydrologic functions and aquatic ecosystem values. Alternatives to the proposed discharge to or fill of "waters of the United States" within the Project mine and process area are discussed in Section 2.2 of this EIS/EIR; this analysis supports the conclusion that there are no practicable alternatives to the proposed discharge which would have less adverse impact on the aquatic ecosystem. Section 4.1.3.1.2 concludes that the discharges would not cause or contribute to violations of any applicable state water quality standard, violate any applicable toxic effluent standard or prohibition, or cause or contributed to substantial degradation of the "waters of the United States". Section 4.1.5.3.3 concludes that the mitigated effects of the Proposed Action on the only effected endangered species (desert tortoise) would be below the level of significance, and the Biological Assessment submitted by the BLM to the USFWS for the USFWS Biological Opinion concludes that, with mitigation, the Proposed Action would not jeopardize the continued existence of the desert tortoise. It is also anticipated that, pursuant to 33 CFR 325.4, the ACOE would consider all of the mitigation measures proposed within this EIS/EIR which may be imposed as conditions of approval by the BLM, County of Imperial, and other federal, state, and local agencies which would achieve the objectives of the ACOE Section 404 program, and especially the conditions of approval proposed in the Stream Alteration Agreement between Glamis Imperial and the CDFG. Accordingly, the effects of the Proposed Action on "waters of the United States" is below the threshold of significance.

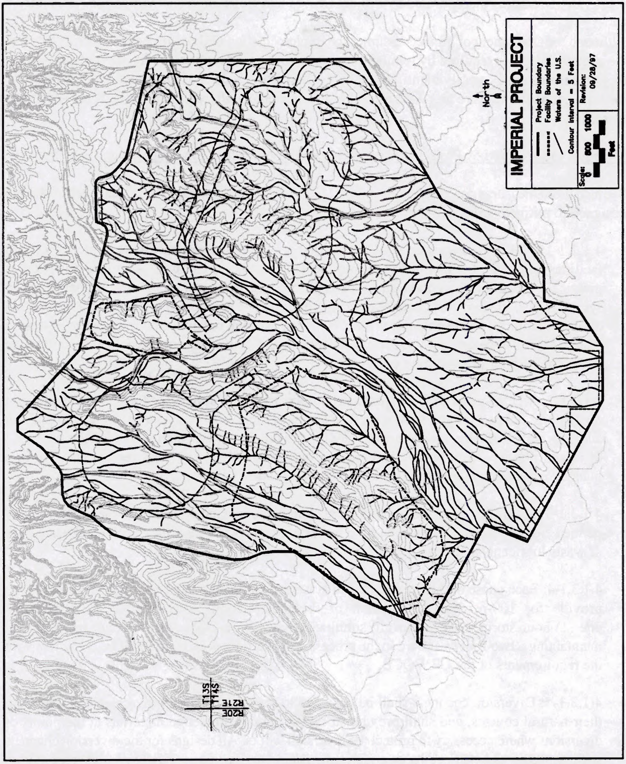

Figure 4.1: Delineated "Waters of the United States" Dredged or Filled Within the Project Mine and Process Area

4.1.3.1.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

See also those measures described in Section 4.1.2.3 designed to mitigate erosion and Section 4.1.5.4 designed to mitigate wildlife impacts.

- 4.1.3.1-1: Major watercourses shall be diverted only to the extent necessary to protect Project facilities, and shall be diverted back into the same wash system after as short a diversion as practical. Permanent diversion channels shall be built to approximate the original drainage system in both gradient and channel geometry, and shall be engineered to adequately contain and deliver stream flows resulting from the 100-year/24-hour precipitation event. The diversion system shall also be designed to adequately contain and deliver stream flows predicted from the 500-year, 24-hour precipitation event.

- 4.1.3.1-2: All chemicals shall be stored in conformance with applicable local, state and federal regulations. All non-mining wastes shall be stored in secondary containment areas, as required, and disposed of off-site in an approved landfill. Regulated wastes shall be recycled or disposed of in conformance with all applicable local, state and federal laws and regulations, and in a manner approved by the responsible regulatory agencies.

- 4.1.3.1-3: Major maintenance of equipment shall be conducted within the concrete-paved and bermed areas of the maintenance yard to the extent possible to minimize accidental discharges of waste lubricants and other materials to the ground.

- 4.1.3.1-4: Each phase of the heap leach pad system (heap, pad, ponds, etc.) shall be designed to provide for 100-percent containment of the precipitation from the maximum probable one (1)-hour storm event occurring simultaneously with a 24-hour power outage while still maintaining a two-foot freeboard in the process and overflow ponds, and shall be consistent with the requirements of the CRWQCB.

- 4.1.3.1-5: Diversion channels shall be designed to prevent the abrupt diversion of flows from their natural courses, and shall provide sufficient natural protective materials at the points of diversions where necessary to protect the diversion works. All designs for the diversion channels shall be signed and stamped by an engineer registered to practice in California and submitted to

the Imperial County Public Works Department for approval prior to commencement of construction.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

See also those measures described in Section 4.1.2.3 designed to mitigate erosion and Section 4.1.5.4 designed to mitigate wildlife impacts.

- 4.1.3.1-6: Project facilities shall not be constructed within special flood hazard zones (Zone A) as noted on Federal Emergency Management Agency (FEMA) National Flood Insurance Program Flood Insurance Rate Map (FIRM) for Imperial County, California (Unincorporated Areas), Panel 700 of 1175, Community-Panel Number 060065 0700 B, Effective Date: March 15, 1984, except as may be authorized by a Development Permit approved by the Imperial County Flood Administrator pursuant to Division 4 of Title 7 of the codified ordinances of Imperial County and, if applicable, restrictions contained in the approvals of the appropriate federal authorizing agencies.

- 4.1.3.1-7: Applicant shall acquire and comply with the necessary approvals from the U.S. Army Corps of Engineers for all jurisdiction "waters of the United States" under Section 404 of the Clean Water Act which may be dredged or filled through Project actions.

Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts:

See also those measures described in Section 4.1.5.4 designed to mitigate wildlife impacts and those measures described in Section 4.1.5.2 designed to mitigate adverse effects on vegetation and plant habitat.

No mitigation measures are proposed or recommended.

4.1.3.1.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

Implementation of the Proposed Action would result in unavoidable, although not significant, adverse effects to surface water flows within the Project mine and process area as a result of the permanent diversion of portions of the ephemeral stream channels within the Project mine and process area.

4.1.3.2. Ground Waters

4.1.3.2.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Substantially degrade water quality;
- Contaminate a public water supply;
- Substantially degrade or deplete ground water resources; or
- Interfere substantially with ground water recharge.

4.1.3.2.2. Impacts of the Proposed Action

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: clarify the relationship of the ground waters in the Project area to the Colorado River aquifer; add a discussion of the absence of impacts to seeps and shallow water wells located in the vicinity of the Project ground water well field area; reduce the estimated quantity of water seeping from All American Canal to the Amos-Ogilby-East Mesa Basin; include a discussion of Imperial County's Ground Water Management Ordinance and requirement for permit; and discuss the relationship between the ground waters in Picacho Wash Basin and the Project mine and process area.

<u>Ground Water Production</u>:

Ground water would be produced to supply water for heap leach processing and other service water requirements. An annual maximum of 1,200 afy of ground water would be supplied from up to four (4) wells drilled in the Project ground water well field area within the Project ancillary area southwest of the Project mine and process area. Imperial County's "Ground Water Management Ordinance" requires that a Ground Water Extraction Permit be obtained prior to commencing the drilling of ground water production wells. The Imperial County Public Works Director is required to determine whether sufficient ground water is available for the proposed use based on the projected use of ground water by the Project in accordance with Section 56614.01(b) of the ordinance. Exemptions from obtaining a permit are allowed for the drilling of production exploration wells.

The projected drawdown of ground water levels in the vicinity of the Project ground water well(s) as a function of time was calculated using data collected during the test of ground water exploration

well PW-1, which was drilled under the Ground Water Management Ordinance permit exemption for production exploration wells (WESTEC, Inc. 1996a; see Table 4.2). These calculations assumed an individual ground water supply well, located in the vicinity of ground water exploration well PW-1, would produce approximately 725 gpm, or 1,170 afy, for 20 years. An average hydraulic conductivity of 16 ft/day (5.6 x 10^{-3} cm/sec) was assumed for all calculations. Several different drawdown scenarios were calculated using a range of aquifer parameters. The calculations were performed using an aquifer thickness of 300 feet to 600 feet, and a storage coefficient ranging from 0.02 to 0.002. The calculations show that drawdowns ranging from 1.5 feet to 6.4 feet are projected to occur at distances of approximately 50,000 feet (approximately nine and one-half (9.5) miles) from the pumping well after 20 years of continuous pumping (WESTEC, Inc. 1996a). Maximum predicted drawdown at a distance of only 1,000 feet from the modeled water supply well is 19.2 to 24.4 feet. These results would likely be conservative because they assume: no recharge of the ground water basin (previously estimated at 30,000 afy); all wells would be located in the same aquifer as the production well; and conservative thicknesses for the aquifer (thicknesses of 1,000 feet have actually been measured).

Table 4.2: Summary of Calculated Well Drawdown After 20 Years

Pumping Rate (gpm)	Aquifer Thickness (ft)	Transmissivity (ft^2/day)	Storage Coefficient	Distance to Drawdown Contour in feet			
				1,000	10,000	20,000	50,000
725[1]	300	4,800	0.02	19.2	8.6	5.4	1.8
725	400	6,400	0.02	14.9	6.9	4.5	1.7
725	500	8,000	0.02	12.2	5.8	4.0	1.6
725	600	9,600	0.02	10.4	5.1	3.4	1.5
725	300	4,800	0.002	24.4	13.8	10.6	6.4
725	400	6,400	0.002	18.8	10.8	8.5	5.3
725	500	8,000	0.002	15.4	9.0	7.1	4.6
725	600	9,600	0.002	13.0	7.7	6.1	4.0

[1]This pumping rate is equivalent to approximately 1,200 afy.

Source: WESTEC, Inc. 1996a

Conservative ground water level drawdowns were also calculated for three (3) specific wells located in the vicinity of the Project: the Gold Rock Ranch well, located approximately four and one-half (4.5) miles south-southwest of well PW-1; the Mesquite Mine well GF-3A, located approximately eight (8) miles northwest of well PW-1; and the American Girl Mine well 26-2, located approximately eight (8) miles south of well PW-1 (WESTEC, Inc. 1996a; see Table 4.3). For an aquifer with a thickness of 500 feet (a saturated thickness of 500 feet was used for the alluvial aquifer to account for the thickening of the aquifer to the southwest (Dutcher, et. al. 1972)) and a storativity value of 0.02, a Project well pumping at a rate 725 gpm (approximately 1,200 afy) over

a period of 20 years was predicted to result in a drawdown of 3.7 feet in the Gold Rock Ranch well, and a drawdown of 1.8 feet in both the Mesquite Mine well and the American Girl Mine well (WESTEC, Inc. 1996a). These conservative drawdowns represent a three (3) percent, one-half (0.5) percent, and one and one-half (1.5) percent drawdown of the depth of the Gold Rock Ranch, Mesquite Mine, and American Girl Mine ground water wells, respectively, over the life of the Project. These drawdowns, and their effects on the projects and the ground water aquifer, are below the level of significance.

Table 4.3: Calculated Drawdown of Selected Wells After 20 Years

Pumping Rate (gpm)	Aquifer Thickness (ft)	Transmissivity (ft^2/day)	Storage Coefficient	Gold Rock Ranch Well (126 ft. water column) 4 miles from well	Mesquite Mine Well (470 ft. water column) 8 miles from well	American Girl Mine Well 26-2 (110 ft. water column) 9 miles from well
				(ft of drawdown)		
725	500	8,000	0.02	3.7	1.8	1.8

Source: WESTEC, Inc. 1996a

Wells for the production of ground water for wildlife (guzzler wells, or "extraction devices"), which are powered by windmills, have been drilled within the Algodones Sand Dunes north of Highway 78 and west of the Southern Pacific railroad tracks by the U.S. Bureau of Reclamation (Personal Communication, Randy Rister, ICFGC, June 26, 1997). The wells were drilled to depths of only 75 to 150 feet below ground surface, or approximately 200 feet AMSL. As static ground water levels in the Project ground water production area are greater than 500 feet below ground surface, or approximately 0 feet AMSL, and the guzzler wells are all located further than 20 miles northwest of the Project ground water well field, ground water production for the Project should have no effect on the water available to the guzzler wells.

Several small water seeps are located northwest to southwest of the Project ground water well field area in the vicinity of and adjacent to the eastern side of the Algodones Sand Dunes (Personal Communication, Randy Rister, ICFGC, June 26, 1997). The source of the water for the seeps has not been identified in any area hydrologic studies; however, because the depth to ground water in the ground water well field area is several hundred feet, it is believed that the seeps result from near surface flows of water as sub-flow in ephemeral stream channels, or the surface outflow of precipitation which flows through the sand dunes. In either case, ground water production from the Project ground water well field area, produced from depths of greater than 500 feet below ground surface and at least five (5) miles distant, would not impact the shallow source of the seeps. Furthermore, two (2) production wells, one (1) at the Gold Rock Ranch and one (1) at the Mesquite Mine are both closer to the seeps than the Project ground water well field. No known effects to the seeps from the pumping of these two (2) wells have been observed.

It is unlikely that the Project's ground water production would affect ground water located in the Picacho Wash Basin. A number of published hydrogeologic studies have placed a ground water divide between the Amos-Ogilby-East Mesa Basin and the Picacho Wash Basin, that is, between the Cargo Muchacho Mountains and Picacho Peak (see Figure 3.10), such that ground water would flow away from, rather than toward or across, this divide (Bedinger, et al. 1983; Loeltz, et. al. 1975; and Dutcher, et al. 1972). Furthermore, bedrock depth in the surface water divide between the "Picacho Wash Drainage Basin" and the "Indian Wash Drainage Basin" (at an elevation of approximately 960 feet) is assumed to be shallow, no deeper than several hundred feet, since this surface water divide is bounded by the exposed bedrock on the northeast and west-southwest. The depth to bedrock in the Project mine and process area is zero (0) to 300 feet below ground surface (860 to 560 feet AMSL). Exploration drilling to the southeast of the Project mine and process area has also encountered bedrock at relatively shallow depths (Personal Communication, Dan Purvance, Chemgold, 1996) (see Figure 3.12). Thus, while bedrock is not exposed at the surface of the surface water divide between the "Indian Wash Drainage Basin" and the "Picacho Wash Drainage Basin," and no data (gravity, etc.) has been made available to judge the depth to bedrock in this area, it is very likely that a subsurface bedrock barrier to ground water flow between the Amos-Ogilby-East Mesa and the Picacho Wash ground water basins exists in the same location as the surface divide. Any effect to ground water in the Picacho Wash Basin, were it to occur, would be below the level of significance.

Comparing the amount of water projected to be extracted during the life of the Project to the estimated usable and recoverable stored water and estimated recharge, the Project should not substantially impact the alluvial ground water resources of the area. The Project's maximum annual extraction rate of 1,200 afy represents about four (4) percent of the annual 30,000 acre-feet recharge of the entire Amos-Ogilby-East Mesa Basin. Over the 20-year projected life of the Project, the Project would use an estimated 24,000 acre-feet of water, which represents approximately 0.01 percent of the estimated 230,000,000 acre-feet of useable and recoverable water in the Amos-Ogilby-East Mesa Basin (WESTEC, Inc. 1996a), or approximately 0.02 percent of the estimated 126,000,000 acre-feet of useable and recoverable water in the Amos-Ogilby Basin alone. These effects are below the level of significance.

Ground water inflows into open pits are predicted to be very small, only 1.5 gpm (2.4 afy) for the West Pit and 0.7 gpm (1.1 afy) for the East Pit. This rate of ground water inflow would have a negligible effect on ground water levels in the vicinity of the pits or beyond. Ground water entering either of these pits during mining operations would be utilized in dust control operations, or collected and used in process operations. No ground water is anticipated to be encountered in the Singer Pit. The impacts from ground water inflow into the pits to the surrounding aquifer is below the level of significance.

Ground Water Quality:

Given the depth to ground water in the Project mine and process area, there is little potential for degradation of ground water quality from accidental spills or leakage of chemicals or regulated wastes from containment areas or from the leach pad facility. Minor spills of chemicals and regulated wastes may occur during the life of the Project, but should not result in any substantial degradation of ground water quality if promptly contained and collected and properly disposed of. The Proposed Action also includes measures to reduce the potential for spills of chemicals or regulated waste to below the level of significance.

Based upon the high acid neutralization potential reported for the samples of waste rock and leached ore in the Waste Characterization Study (see Appendix C-1), water from rainfall moving through waste rock or neutralized leached ore would not be likely to generate acidic waters which could degrade ground water quality. In addition, the results of the SPLP extractions conducted on the same rock materials indicate that waters from rainfall would not be likely to leach substantial quantities of metals from these rock materials, and ground water quality would not be degraded. This impact would not be significant.

The heap leach pad has been designed with a dual liner system to decrease the potential for any leakage of leach solution. The first portion of the leach pad would be constructed with a liner consisting of a composite of 40-mil polyvinyl chloride (PVC) primary and 20-mil PVC secondary geomembrane liners placed directly on a minimum of four (4) inches of compacted, fine-grained, bedding material. Similar liners were approved by the CRWQCB and constructed by others at the nearby American Girl mine in 1995. The USEPA is reported to have recognized the acceptability (for seamabilty, punctureability and installability) of 20-mil PVC liners for landfills (Peggs 1992), and the United States Bureau of Reclamation (USBR), which has installed over 40 million square feet of PVC in canal linings since 1968, has specified 20-mil thicknesses since the early 1980's (Comer, et al. 1996). The pad is also designed to drain by gravity into the solution collection system and solution ponds so that there is only a minimum layer of saturated drain rock (typically less than one (1) foot) above the liner, thus reducing the hydraulic head across the liner.

Monitoring of both the vadose zone and ground water for evidence of leakage of leach solution would be conducted under the Proposed Action. The vadose zone monitoring system would be placed under only approximately 25 percent of the leach pad liner and process ponds, but would be located directly under the lowest points of each cell of the heap leach pad and the process ponds. Because of its placement, this vadose monitoring system should be capable of detecting any substantial leak through the double liner system of the heap leach pad and process ponds. The CRWQCB would typically require monthly sampling of both the vadose zone and ground water monitoring points and analysis for the constituents of concern (those constituents of the process solution, such as cyanide and select metals, which if detected in the vadose zone or ground water monitoring points would likely indicate a leak). Results would be required to be reported monthly, more rapidly if evidence of a leak is detected. Detected leaks under the pad would be evaluated and

corrected under the supervision of the CRWQCB, either through excavation of the heaped material and repair of the liner, if the height of the heap at the time of detection of the leak is not too great, or through reducing or eliminating the application of leach solution to that portion of the heap located over the leak. Leaks under the process ponds would be repaired after emptying the appropriate pond. Leaks are not common place and are usually detected while still small. Remediation of leaked solution is typically not required because the weak cyanide solution degrades rapidly as the pH drops and it is oxidized in the air, and the soil and rock material above the ground water can attenuate the concentrations of the metals. Taken together, these measures reduce the potential for any ground water quality degradation from the heap leach pad and process ponds to insignificance.

It is also unlikely that any degradation of ground water in the Picacho Wash Basin would result from any accidental spills or leakage of chemicals or regulated wastes from Project containment areas or from the leach pad facility. In addition to the presumed bedrock ground water barrier located between the Indian Wash portion of the Amos-Ogilby-East Mesa Basin and the Picacho Wash Basin, the ground water gradient established by the data presented in Appendix E-1 and Appendix E-2 clearly trends down to the southwest, away from the Project mine and process area toward the area of the Project production well field (near well PW-1), and away from the divide between the Indian Wash portion of the Amos-Ogilby-East Mesa Basin and the Picacho Wash Basin. Thus, impacts to the ground water of the Picacho Wash Basin would be below the level of significance.

Pit Water Quality:

As discussed in Section 4.1.3.1.2, the formation of a pit lake in the bottom of the East Pit following the completion of pit mining is not likely to occur, and the Proposed Action includes backfilling the pit with waste rock material to an elevation that is above the predicted level of any pit lake should a study reasonably determine that a pit lake may form (see Section 2.1.3). Based upon the high acid neutralization potential reported for the samples of waste rock and leached ore in the Waste Characterization Study (see Appendix C-1), ground water moving through backfilled waste rock in either the West Pit or East Pit would not be likely to generate acidic waters. In addition, the results of the SPLP extractions conducted on the same rock materials indicate that the ground waters would not be likely to leach substantial quantities of metals from these rock materials, and the ground water quality would likely remain relatively unchanged.

To further assess the potential interactions which may occur between the waste rock which may be backfilled into either the West Pit or East Pit and the ground water which may enter either pit, an additional geochemical investigation was conducted (see Appendix C-2) to supplement the Waste Characterization Study. Samples of each of the rock types which may be backfilled into either the West Pit or East Pit were processed by several standard USEPA chemical-extraction techniques to conservatively simulate what constituents may be leached from the rock if exposed to ground waters entering a backfilled pit. Modeling was then conducted using analyses of the extracted constituents,

analyses of the ground water, and the mineral phases of the rock to evaluate impacts to the ground water after equilibration.

Representative composite samples of each of the principal rock types to be mined (sericite gneiss, biotite gneiss, and gravels) (see Section 3.1.1) were first extracted using USEPA Method 1312, which is designed to determine the mobility of both organic and inorganic constituents in liquids, soils and wastes. It uses a 60/40 weight percent of sulfuric acid/nitric acid diluted with deionized water to a pH of 5.0 added to the solid sample, which is then agitated for 18 hours. The resultant liquid (leachate) is then filtered and analyzed. The analytical results from each of the three (3) samples show that the extracted constituents are in low concentrations, in most cases at or below the respective concentrations in the ground water currently in the undeveloped pits, and are below current California water quality standards except the primary selenium maximum contaminant limit (MCL) and the secondary manganese MCL (see Appendix C-2).

Six (6) additional representative composite samples of four (4) rock types (sericite gneiss, biotite gneiss, volcanics, and gravels) (see Section 3.1.1) were also collected from the locations of both the East Pit and West Pit and extracted using USEPA Method 1320, the Multiple Extraction Procedure, which is "designed to simulate the leaching that a waste would undergo from repetitive precipitation of acid rain on an improperly designed sanitary landfill. The repetitive extractions reveal the highest concentration of each constituent that is likely to leach in a natural environment." (USEPA 1986). As such, this test is very conservative for the types of geologic materials and the environment anticipated within the backfilled Project pits.

The first Method 1320 extraction uses USEPA Method 1310 (Extraction Procedure (EP) Toxicity Test Method) to leach constituents from the solid by agitating for 24 hours with deionized water which is maintained at a pH of 5.0 with acetic acid. The resulting leachate is then filtered and analyzed. Nine (9) subsequent extractions are then sequentially undertaken on the solid residual using a 60/40 weight percent of sulfuric acid/nitric acid diluted with deionized water to a pH of 3.0, each agitated for 24 hours. The resultant leachate from each extraction is filtered and analyzed.

The analytical results from the six (6) samples used in the USEPA Method 1320 extraction show that the concentration of the constituents in the first extraction are much higher than in subsequent extractions (see Appendix C-2). TDS and alkalinity concentrations were uniformly higher than in the ground water in the first extraction for all rock types, as were the concentrations of aluminum, calcium, and manganese. The pH was also uniformly lower than the ground water, reflecting the acidic extraction fluid. Concentrations of copper, lead, potassium, strontium, titanium, zinc, barium, chromium, thallium, beryllium, magnesium, cadmium, arsenic, or silver in the first extractions of some samples also slightly exceeded the respective constituent concentrations in the ground water. Constituent concentrations in extractions 2 through 10 were typically lower than concentrations in either the ground water or extraction 1, although iron concentrations increased in nearly all samples in the later extractions, reflecting the artificially low pH in the extraction fluid (see Section 2.1.4) and the lack of alkalinity remaining in the sample.

The analytical results of the Method 1320 extractions show that high concentrations of calcium and available alkalinity may leach from the backfilled material, probably due to the rigorous leaching procedure and the dissolution of calcite ($CaCO_3$) which is present as a secondary mineral phase in the rocks. The relatively high manganese concentrations in the Method 1320 extraction leachates are also due to the rigorous leaching method and the dissolution of secondary manganese minerals (oxyhydroxides) in the rock.

Geochemical models were also run to test the effects of the ground water flowing into the pits and equilibrating with the backfilled material under earth surface conditions. The results of these geochemical models were then evaluated relative to existing (background) ground water quality and to the potential impacts to ground water quality downgradient from the pits. Because calcite ($CaCO_3$) is the most reactive mineral phase present in the rocks, the models assumed that inflowing ground water would equilibrate with calcite and with atmospheric carbon dioxide (CO_2). The model inputs were derived from the analytical results of the ground water samples collected in the areas of the pits, the Method 1312 extractions, and the Method 1320 extractions. The results of all of the geochemical models predict that the dissolved constituent concentrations present in the ground water which has equilibrated with the backfilled material in the pits would be at, or below, the current concentrations present in the ground water. Therefore, no impacts to ground water quality are expected to occur from the complete or partial backfilling of any of the Project pits.

4.1.3.2.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

See also those measures described in Section 4.1.3.1.3 designed to mitigate water quality degradation from chemical spills and use, Section 4.1.12.3 designed to respond to and remediate any chemical spills, and Section 4.1.5.4 designed to eliminate the possibility of a pit lake to mitigate potential impacts to wildlife.

- 4.1.3.2-1: To prevent excessive drawdown or possible damage to the well or pumping system, ground water production from well PW-1 shall be limited to a maximum average of 550 gpm unless a higher pumping rate, supported by reasonable proof of increased well efficiency, is approved by the ICPWD. The maximum average production rate from each additional production well drilled shall be limited to that rate which prevents excessive drawdown or possible damage to the well or pumping system.

- 4.1.3.2-2: The total annual ground water production rate shall not exceed 1,200 afy.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.3.2-3: Ground water production and monitoring wells shall be plugged and abandoned in conformance with applicable regulatory requirements, including 14 CCR 3713(a).

- 4.1.3.2-4: The heap leach pad shall be designed, constructed and operated in conformance with the specifications, requirements and prohibitions of Waste Discharge Requirements issued by the CRWQCB.

- 4.1.3.2-5: The heap leach pad shall be monitored in conformance with the requirements of the Monitoring and Reporting Program issued by the CRWQCB. This would include collection of groundwater quality baseline data prior to mine development.

- 4.1.3.2-6: Applicant shall obtain approval from the ICPWD of a "Ground Water Management Ordinance" permit prior to drilling any ground water production well intended for continued use. Production of ground water from the Project ground water well field shall be monitored and reported to the ICPWD consistent with the requirements of this permit.

Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts:

No other mitigation measures are proposed or recommended.

4.1.3.2.4. Unavoidable Adverse Impacts and Level of Significance After Mitigation

Implementation of the Proposed Action would result in the unavoidable, but not significant, loss of ground water produced from the ground water well field, and may result in the unavoidable loss of minor quantities of ground water if exposed as seeps in the walls of the open pit after the cessation of mining.

Effects of the Proposed Action to ground water resources would be below levels of significance.

4.1.4. Air Resources

4.1.4.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Violate any regulatory requirement of the ICAPCD; or
- Violate any ambient air quality standard; or
- Contribute substantially to an existing or projected air quality violation; or
- Expose sensitive receptors to substantial pollutant concentrations.

4.1.4.2. Impacts of the Proposed Action

In addition to other changes, this section has been substantially modified from the November 1996 Draft EIR in response to comments to: recalculate fugitive emissions for travel on unpaved roads (and other revisions to reflect changes in the Proposed Action); and add additional cumulative analysis for air quality requested (cumulative analysis extended).

Air Pollutant Emission Sources and Emissions:

The Proposed Action consists of many activities and operations, each of which may have the potential to emit air pollutants. Rule 101 (Definitions) of the Rules and Regulations of the ICAPCD (Rules) defines a "source" as "a specific device, article, or piece of equipment from which air contaminants are emitted, or the distinct place (such as with fires or other chemical activity) from which air pollutants are emitted." Rule 207B. (New and Modified Stationary Source Review-Definitions) goes further to define "emissions unit" as "an identifiable operation or piece of process equipment such as an article, machine, or other contrivance which emits, has the potential to emit, or results in the emissions of any affected pollutant directly or as fugitive emissions." Rule 101 goes on to define "fugitive emissions" as "those emissions which cannot reasonably pass through a stack, chimney, vent or other functionally equivalent opening." A comprehensive list of each of the identified individual potential sources of Project air pollutant emissions ("emission units"), organized into "emission groups" of similar activities (such as mining, heap leaching, etc.), are presented in Table 4.4.

Table 4.4: List of Potential Emission Sources and Type for the Proposed Action

LIST OF POTENTIAL EMISSION SOURCES AND TYPE FOR THE PROPOSED ACTION					
Emission Unit	Emission Unit Description	Emission "Source" Type			
		Point	Fugitive	Mobile	Other
Emission Unit Group 1: Mining Activity					
1.001	Drilling - Waste Rock		X		
1.002	Drilling - Ore		X		
1.003	Blasting - Waste Rock		X		
1.004	Explosives Detonation - Waste Rock Blasting		X		

LIST OF POTENTIAL EMISSION SOURCES AND TYPE FOR THE PROPOSED ACTION					
Emission Unit	**Emission Unit Description**	**Emission "Source" Type**			
		Point	**Fugitive**	**Mobile**	**Other**
1.005	Blasting - Ore		X		
1.006	Explosives Detonation - Ore Blasting		X		
1.007	Waste Rock Loading		X		
1.008	Ore Loading		X		
1.009	Waste Rock Dumping		X		
1.010	Ore Dumping		X		
1.011	Waste Rock Dozing		X		
1.012	Waste Rock Hauling		X		
1.013	Ore Hauling		X		
1.014	Ammonium Nitrate Prill Silo Loading	X			
1.015	Ammonium Nitrate Prill Silo Unloading	X			
1.016	Wind Erosion (Waste Rock Stockpile)		X		
1.017	Wind Erosion (Soil Stockpiles)		X		
1.018	Haul Truck (Combustion)			X	
1.019	Mine Dozer (Combustion)			X	
1.020	Drill Rig (Combustion)			X	
1.021	Loader (Combustion)			X	
1.022	Clean-Up Loader (Combustion)			X	
Emission Unit Group 2: Heap Leaching Activity					
2.001	Portable R-O-M Lime Silo Loading	X			
2.002	Portable R-O-M Lime Hopper Loading	X			
2.003	Lime Application to Ore		X		
2.004	Ore Ripping/Spreading/Dozing		X		
2.005	Heap Leach Dozer (Combustion)			X	
2.006	Cyanide Application and Leaching		X		
2.007	Pregnant Solution Pond		X		
2.008	Barren Solution Pond		X		
2.009	Wind Erosion (Heap Leach Pad) - Non-Leach		X		
2.010	Wind Erosion (Heap Leach Pad) - Leach		X		
Emission Unit Group 3: Process Plant					
3.001	Carbon Adsorption Tank 1		X		
3.002	Carbon Adsorption Tank 2		X		
3.003	Carbon Adsorption Tank 3		X		
3.004	Carbon Adsorption Tank 4		X		
3.005	Carbon Adsorption Tank 5		X		
3.006	Acid Wash Tank		X		X
3.007	Cyanide Make-up Tank		X		

LIST OF POTENTIAL EMISSION SOURCES AND TYPE FOR THE PROPOSED ACTION					
Emission Unit	**Emission Unit Description**	**Emission "Source" Type**			
		Point	**Fugitive**	**Mobile**	**Other**
3.008	Strip Tank		X		
3.009	Electrowinning Cell		X		X
Emission Unit Group 4: Refining					
4.001	Mercury Retort Furnace (Electric)	X			
Emission Unit Group 5: Laboratory					
5.001	Jaw Crusher	X			
5.002	Pulverizer	X			
5.003	Fume Hood	X			
5.004	Waste Acid Tank		X		
Emission Unit Group 6: Shop Area					
6.001	Main Diesel Tank 1				X
6.002	Street Diesel Tank				X
6.003	Unleaded Gasoline Tank				X
6.004	Coolant Tank				X
Emission Unit Group 7: Mine & Process Area Support Activities					
7.001	Water Truck (Combustion)			X	
7.002	Water Truck Traffic		X		
7.003	Backup Diesel-Fueled Generator	X			
7.004	Mobile Light Plant - Pit #1			X	
7.005	Mobile Light Plant - Pit #2			X	
7.006	Mobile Light Plant - Heap			X	
7.007	Mobile Light Plant - WRS			X	
7.008	Cable Reel Machine			X	
7.009	Grading of Road Surface		X		
7.010	Grader (Combustion)			X	
Emission Unit Group 8: Other Mobile Emission Units					
8.001	On-Site Delivery Truck Traffic		X		
8.002	On-Site Light Vehicle Traffic		X		
8.003	Off-Site Delivery Truck Traffic		X		
8.004	Off-Site Light Vehicle Traffic		X		
8.005	On-Site Delivery Truck (Combustion)			X	
8.006	On-Site Light Vehicle (Combustion)			X	

In addition to being organized into emission groups, these emission units can also be characterized by the "type" of emission unit. For the sake of this analysis, four (4) different "types" of emission units were identified which are applicable to the Project: stationary "point" sources (e.g., the

diesel-fuel emergency electric generator); "fugitive" sources (i.e., those which do not emit pollutants from single points, but from diffuse areas (e.g., dust generated by vehicles moving on unpaved roads or windblown dust)); mobile combustion sources (e.g., the "tailpipe" emissions from haul trucks, dozers, etc.); and "other" sources (e.g., vapor emissions from the storage of fuel in storage tanks). Table 4.4 also lists the emission "type" of each of the Project emission sources.

Estimates of the annual emissions of each applicable criteria air pollutant from each emission unit during full operation of the Project were prepared using generally available emission estimating techniques and operational parameters for each of the emission units as provided by Glamis Imperial, assuming the implementation of the "emission control" techniques proposed to be implemented as a part of the Proposed Action to reduce emissions (such as the watering of roads) [see Appendix O of this EIS/EIR]. Table 4.5 provides a summary of the maximum estimated daily (in pounds per day) and annual (in tons per year) regulated (criteria) air pollutant emissions expected from the Project during full operations. During the periods of Project construction, and post-Project reclamation, emissions from the Project would be limited to emissions of fugitive particulate matter from loading, hauling, dumping, dozing, and vehicular traffic in the Project area as well as combustion emissions from mobile sources.

Table 4.5: Summary of Total Calculated Emissions of Regulated Air Pollutants

SUMMARY OF TOTAL CALCULATED EMISSION OF REGULATED AIR POLLUTANTS													
Emission Unit No.	Emission Unit Description	Regulated Air Pollutants											
		TSP		PM_{10}		SOx		NOx		CO		VOCs/ROGs	
		(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)
Emission Unit Group 1: Mining Activity													
1.001	Drilling - Waste Rock	7.15	0.93	3.58	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.002	Drilling - Ore	3.58	0.47	1.79	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.003	Blasting - Waste Rock	149.00	13.00	74.70	6.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.004	Explosives Detonation - WR Blasting	0.00	0.00	0.00	0.00	45.40	3.96	386.00	33.60	1,530.00	133.00	0.00	0.00
1.005	Blasting - Ore	0.00	6.51	0.00	3.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.006	Explosives Detonation - Ore Blasting	0.00	0.00	0.00	0.00	0.00	1.98	0.00	16.80	0.00	66.60	0.00	0.00
1.007	Waste Rock Loading	69.50	8.21	32.90	3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.008	Ore Loading	34.70	4.12	16.30	1.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.009	Waste Rock Dumping	171.00	20.30	80.90	9.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.010	Ore Dumping	85.50	10.10	40.50	4.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.011	Waste Rock Dozing	33.70	6.15	4.31	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.012	Waste Rock Hauling	338.00	39.30	152.00	17.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.013	Ore Hauling	169.00	19.60	76.10	8.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.014	Ammonium Nitrate Prill Silo Loading	0.50	0.06	0.25	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.015	Ammonium Nitrate Prill Silo Unloading	0.45	0.06	0.23	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.016	Wind Erosion (Waste Rock Stockpiles)	17.90	3.20	8.97	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.017	Wind Erosion (Soil Stockpiles)	4.49	0.80	2.24	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.018	Haul Truck (Combustion)	120.00	21.90	62.50	11.40	266.00	48.50	2,440.00	445.00	1,050.00	192.00	116.00	21.10
1.019	WRS Dozer (Combustion)	6.34	1.16	3.90	0.60	13.40	2.44	123.00	22.40	52.90	9.65	5.83	1.06
1.020	Drill Rig (Combustion)	38.30	7.69	19.90	4.80	18.60	3.74	284.00	56.90	61.10	12.20	22.50	4.51
1.021	Loader (Combustion)	15.80	2.88	8.21	1.50	16.80	3.07	183.00	33.40	53.10	9.70	23.20	4.24
1.022	Clean-up Loader (Combustion)	4.18	0.76	2.18	0.40	4.46	0.81	48.50	8.86	14.10	2.57	6.16	1.12
SUBTOTAL - EMISSION UNIT GROUP 1		1,270.00	167.00	591.00	78.00	364.00	64.50	3,460.00	617.00	2,760.00	426.00	174.00	32.10
Emission Unit Group 2: Heap Leaching Activity													
2.001	Portable R-O-M Lime Silo Loading	0.14	0.02	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.002	Portable R-O-M Lime Hopper Loading	1.00	0.12	1.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.003	Lime Application to Ore	0.12	0.01	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SUMMARY OF TOTAL CALCULATED EMISSION OF REGULATED AIR POLLUTANTS													
Emission Unit No.	Emission Unit Description	Regulated Air Pollutants											
		TSP		PM_{10}		SOx		NOx		CO		VOCs/ROGs	
		(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)
2.004	Ore Ripping/Spreading/Dozing	29.70	5.42	3.68	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.005	Heap Leach Dozer (Combustion)	6.34	1.16	3.30	0.60	13.40	2.44	123.00	22.40	52.90	9.65	5.83	1.06
2.006	Cyanide Application and Leaching	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.007	Pregnant Solution Pond	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.006	Barren Solution Pond	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.009	Wind Erosion (Heap) - Non-Leach	8.23	1.47	4.12	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.010	Wind Erosion (Heap) - Leach	0.41	0.07	0.21	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL - EMISSION UNIT GROUP 2		46.00	8.27	12.40	2.18	13.40	2.44	123.00	22.40	52.90	9.65	5.83	1.06
Emission Unit Group 3: Process Plant													
3.001	Carbon Adsorption Tank 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.002	Carbon Adsorption Tank 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.003	Carbon Adsorption Tank 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.004	Carbon Adsorption Tank 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.005	Carbon Adsorption Tank 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.006	Acid Wash Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.007	Cyanide Make-up Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.005	Strip Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.009	Electrowinning Cell	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL - EMISSION UNIT GROUP 3		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emission Unit Group 4: Refining													
3.001	Mercury Retort Furnace (Electric)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL - EMISSION UNIT GROUP 4		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emission Unit Group 5: Laboratory													
5.001	Jaw Crusher	1.02	0.19	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.002	Pulverizer	1.02	0.19	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.003	Fume Hood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.004	Waste Acid Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL - EMISSION UNIT GROUP 5		2.04	0.37	0.15	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emission Unit Group 6: Shop Area													
6.001	Main Diesel Tank 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.04

SUMMARY OF TOTAL CALCULATED EMISSION OF REGULATED AIR POLLUTANTS													
Emission Unit No.	Emission Unit Description	Regulated Air Pollutants											
		TSP		PM_{10}		SOx		NOx		CO		VOCs/ROGs	
		(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)	(lbs/day)	(tons/yr)
6.002	Street Diesel Tank	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
6.003	Unleaded Gasoline Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.26	0.60
6.004	Coolant Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL - EMISSION UNIT GROUP 6		0.00	0.09	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	3.46	0.63
Emission Unit Group 7: Mine & Process Area Support Activities													
7.001	Water Truck (Combustion)	6.72	1.23	3.50	0.64	11.90	2.16	109.00	19.80	46.90	8.56	5.17	0.94
7.002	Water Truck Traffic	0.23	0.09	0.19	0.02	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
7.003	Backup Diesel Generator	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.38	0.00	0.10	0.00	0.01
7.004	Mobile Light Plant - Pit #1	1.02	0.48	0.48	0.48	0.45	0.08	6.82	1.24	1.47	0.27	0.55	0.10
7.005	Mobile Light Plant - Pit #2	1.02	0.19	0.48	0.09	0.45	0.08	6.82	1.24	1.47	0.27	0.55	0.10
7.006	Mobile Light Plant - Heap	1.02	0.19	0.48	0.09	0.45	0.08	6.82	1.24	1.47	0.27	0.55	0.10
7.007	Mobile Light Plant - WRS	1.02	0.19	0.48	0.09	0.45	0.08	6.82	1.24	1.47	0.27	0.55	0.10
7.008	Cable Reel Machine	2.67	0.48	1.36	0.25	15.50	2.83	96.70	17.60	142.00	25.90	16.70	3.04
7.009	Grading of Road Surface	1.40	0.26	4.11	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.010	Grader (Combustion)	4.08	0.74	2.12	0.39	5.73	1.05	46.60	8.51	10.00	1.83	2.34	0.43
SUBTOTAL - EMISSION UNIT GROUP 7		19.20	3.50	13.10	2.40	34.90	6.37	279.00	51.30	204.00	37.40	26.40	4.83
Emission Unit Group 8: Other Mobile Emission Units													
8.001	On-Site Delivery Truck Traffic	0.38	0.07	0.17	0.03	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
8.002	On-Site Delivery Truck (Combustion)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.00
8.003	On-Site Light Vehicle Traffic	3.77	0.67	1.70	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.004	On-Site Light Vehicle (Combustion)	0.20	0.04	0.10	0.02	0.05	0.01	0.49	0.09	1.65	0.30	0.20	0.04
8.005	Off-Site Delivery Truck Traffic	19.50	3.48	8.77	1.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.006	Off-Site Light Vehicle Traffic	274.00	49.00	124.00	22.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL - EMISSION UNIT GROUP 8		298.00	53.30	134.00	24.00	1.68	0.31	0.06	0.01	0.50	0.09	0.20	0.04
TOTAL - ALL EMISSION GROUPS		1,640.00	233.00	751.00	107.00	413.00	73.30	3,860.00	691.00	3,020.00	473.31	209.00	38.60

The largest proportion of the emission units are the fugitive emission sources, especially emitters of fugitive particulate matter (TSP and PM_{10}). Mining and heap leaching activities, such as blasting, loading, dumping and dozing, release fugitive particulate matter into the air through the physical movement of the ore or waste rock. Ore and waste rock hauling, and truck and vehicle traffic, all generate fugitive particulate matter emissions by traveling on unpaved roads. Finally, wind erosion of both the waste rock stockpiles and ore heap can generate fugitive particulate matter emissions.

Mobile sources, the next largest category of sources, are principally associated with the mining and heap leaching process. They consist almost exclusively of large diesel engines which power the haul trucks, dozers, graders, and water trucks. Because of the high percentages of use (many would operate nearly 24 hours per day), these mobile sources would produce substantial quantities of "tailpipe" combustion emissions, such as NO_x, SO_x, and CO.

Most of the mobile sources fall into the category of "non-road engines," generally defined under 40 CFR §89 as internal combustion engines which are in or propel a vehicle which is not a "road" vehicle, or are portable or transportable, but which do not remain in a fixed location for more than a year. These federal regulations require that "non-road" engines must be manufactured to meet specific emission standards for criteria pollutants, based on the size (hp rating) of the engine and date of manufacture, according to a specific timetable commencing on January 1, 1996. Table 4.6 lists the identified Project "non-road" engines, the size (kW rating) of each, whether the engine would be purchased (in 1998) "new" or "used," and whether the engine would be subject to these new federal emission limitations.

Table 4.6: List of Project "Non-Road" Engines and Applicable Criteria

Engine	Engine Rating	Year of Manufacture	Applicability of 40 CFR 89
Haul Trucks (8)	2,500 hp	1998	No
Dozers (2)	375 hp	1998	Yes
Drill Rigs (2)	550 hp	1998	Yes
Loader (1)	1,250 hp	1998	No
Light Plants (4)	35 hp	1998	No
Cable Reel Machine (1)	350 hp	<1996	No
Clean-up Loader (1)	690 hp	<1996	No
Water Trucks (2)	1,050 hp	<1996	No
Grader (1)	275 hp	1998	Yes
Back-Up Generator (1)	750 hp	1998	Yes

Based on the Project engine size ratings and their assumed date of manufacture (based on the purchase date), less than half of the Project "non-road" engines would be required to be

manufactured to met the new federal emission standards. However, many engine manufacturers are already meeting or exceeding the new emission standards.

Although the Project has a number of stationary point sources, these sources are individually and collectively minor sources of criteria air pollutant emissions. About one-half (½) of the stationary point sources are combustion sources, which as a class emit substantially more gaseous combustion pollutants (NO_x, SO_x, and CO) than particulate matter.

Finally, the "other" category of criteria pollutant emission sources consist exclusively of the diesel, gasoline and other volatile organic compound storage and dispensing tanks. However, the total quantities of these materials emitted by the Project to the atmosphere are small.

Federal PSD Regulations:

Federal Prevention of Significant Deterioration (PSD) regulations are applicable only to major stationary sources which are either specific types of facilities which emit, or have the potential to emit, 100 tons per year or more of a criteria pollutant, or any facility which emits, or has the potential to emit, 250 tons per year or more of any criteria pollutant. Most fugitive emissions, however, are not included as applicable emissions under the federal PSD program. Since the few stationary emission units under the Proposed Action emit collectively substantially less than 1 ton per year of any criteria pollutant, the Project is not subject to federal PSD regulations.

Title V of the CAAA:

The CAAA included Title V, which established a very detailed and extensive operating permit system for "major sources" of regulated air pollutants. The ICAPCD has adopted Rule 900 to implement Title V within the District, and USEPA's delegation of authority to implement Title V through Rule 900 became effective on June 2, 1995. Rule 900 is applicable only to a "major" source of air pollutants, which is defined as "a stationary source which has the potential to emit a regulated air pollutant or a hazardous air pollutant (HAP) in quantities equal to or exceeding the lesser of any of the following thresholds:"

"100 tons per year (tpy) of any regulated air pollutant;"

"10 tpy of one HAP or 25 tpy of two or more HAP's; or"

"Any lesser quantity threshold promulgated by the U.S. EPA."

At present, no lower quantity threshold has been set by the USEPA.

To determine the applicability of Title V (Rule 900) to the Project, an inventory of the annual potential to emit for each of the applicable emission units was conducted for the Proposed Action

(see Appendix O). Since Title V (Rule 900) specifically excludes "fugitive" and "mobile" (road and non-road engine) sources of regulated air pollutants, it is basically applicable only to stationary ("point" and "other") sources of criteria (regulated) air pollutants (and certain HAPs). As such, few of the Project's emission units are included in the Title V applicability for criteria pollutants. The largest applicable annual emission rate for a single criteria pollutant for the Proposed Action is 0.64 tons per year of volatile organic compounds/reactive organic gases (VOCs/ROGs); all of this emitted from the fuel and other organic liquid storage and dispensing facilities.

HAPs are specifically listed hazardous air pollutants, some of which can be found in many of the natural earth materials which would be mined by the Project; in the fuels used and stored by the Project; and in the solution used to leach the precious metals from the ore. Current USEPA and ICAPCD guidance provides that reasonably quantifiable HAP emissions from fugitive sources, as well as from stationary sources, must be counted to determine the applicability of Title V for HAPs. The potential HAPs component of the emitted Project particulates has been conservatively estimated by assuming that all of the HAPs contained in the fugitive particulate matter are subject to Title V (Rule 900). Based upon analyses of ore and waste rock samples collected during exploration drilling (see Section 2.1.4), and using the calculated total annual TSP emission estimates (see Table 4.5), the total annual emission of particulate-based HAPs has been estimated at less than 0.01 tons (see Appendix O).

HAPs released as a result of the combustion of diesel fuel and gasoline in mobile engines are not subject to Title V (Rule 900). In addition, the HAPs released from most uses of the leaching solution (principally HCN) are not subject to Rule 900 because they cannot be reasonably quantified. Due to its limited use, combustion HAPs from the diesel-fueled emergency generator total less than one (1) pound (0.0002 ton) per year. The total annual emission of all potentially applicable HAPs from the Project, including reasonably quantifiable fugitive HCN emissions, is approximately 0.5 tons, substantially below both the 25 ton project-wide Title V threshold and the 10 ton individual HAP Title V threshold (see Appendix O).

<u>New Source Review and Emission Offsets</u>:

Rule 207 of the ICAPCD regulations requires the preconstruction review of new or modified stationary sources to ensure that a project would not interfere with the attainment or maintenance of ambient air quality standards. This rule also states that no net increase in emissions to the air basin would be allowed from new permitted stationary sources with the potential to emit 137 pounds per day (equivalent to 25 tons per year) or more of any nonattainment pollutant or its precursors. Rule 207 also requires that emissions in excess of the 137 pound per day threshold be "offset" with an actual reductions of the same pollutant or its precursors. These offsets can be obtained from another source at the same location, and offset at a ratio of 1:1; or from another source up to 50 miles away at a ratio of 1.2:1. Based upon the emission estimates for permitted stationary sources as presented in Appendix O, which are maximum, not anticipated, emission levels, the Proposed Action

would not emit more than 25 tons per year of any nonattainment pollutant or its precursors, and would be in compliance with Rule 207.

Conformity to the State Implementation Plan

Section 176 of the Clean Air Act (CAA), as amended (42 USC 7401 *et seq.*), and regulations under 40 CFR Part 51, Subpart W, apply to projects within non-attainment areas with respect to the conformity of general federal actions to the applicable State implementation plan (SIP). Under those authorities, "no department, agency or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan." Under CAA 176(c) and 40 CFR Part 51, Subpart W, a federal agency must make a determination that a federal action conforms to the applicable SIP before the action is taken. The emission reduction measures contained in the Proposed Action conform to the requirements of the SIP.

As required by the CAA and the CAAA, the ICAPCD in 1992 issued its final air quality attainment plan (AQAP) outlining how the basin would conform to the requirements of the state implementation plan (SIP). The ICAPCD AQAP requires emission offsets of nonattainment air pollutants to produce net emission reductions within the basin. This is implemented by ICAPCD Rule 207, which requires that emissions of nonattainment air pollutants in excess of 137 pounds per day (25 tons per year) from stationary sources be "offset" with actual net reductions of the same air pollutant or its precursors in excess of the emissions from the project. Based upon the analysis of compliance with Rule 207 presented above, the Proposed Action would not emit more than 25 tons per year of any nonattainment pollutant or its precursors covered by Rule 207, and thus would be in compliance with Rule 207 and conform to the State Implementation Plan.

Best Available Control Technology/Reasonably Achievable Control Measures:

Rule 207 of the ICAPCD regulations also requires the application of Best Available Control Technology (BACT) to any new (stationary) emission unit which has the potential to emit 25 pounds per day (approximately 4.5 tons per year) of any nonattainment pollutant or its precursors. The Project contains no applicable emission unit which produces more than 1 ton per year, and thus is not subject to BACT requirements.

ICAPCD Regulation VIII (Fugitive Dust Requirements for Control of Fine Particulate Matter) requires the implementation of Reasonably Available Control Measures (RACM) to reduce the amount of PM_{10} entrained in the ambient air as a result of emissions generated from anthropogenic (man-made) fugitive dust sources generated from within Imperial County. RACM must be applied to any active operation, except as specifically exempted in the regulations. Because the silt content of both the Project ore and waste rock is less than five (5) percent, and most other Project activities which would generate fugitive PM_{10} are specifically exempted from Regulation VIII, only the use of internal roads for traffic and hauling; the discharge of the lime to the ore trucks; and the soil

stockpiles are subject to RACM for PM_{10}. For each of these activities, the Proposed Action already contains one (1) or more of those measures required as RACM: the haul and maintenance roads are watered at least once per day; the lime discharge to the ore trucks is controlled by water sprays; and emissions from the soil stockpiles are controlled through the application of vegetation. Therefore, there is no regulatory requirement for the implementation of any additional measures to reduce emissions of fugitive PM_{10}.

California Air Toxics "Hot Spots" Information and Assessment Act (AB2588):

The Air Toxics "Hot Spots" Information and Assessment Act (AB2588) ("Hot Spots" Act) was enacted in September 1987, and subsequently amended in 1992 and again in 1997. The goal of the "Hot Spots" Act is to collect emission data indicative of routine, predictable releases of toxic substances to the air; to identify facilities having localized impacts from these releases; to evaluate health risks from exposure to these emissions; to notify nearby residents of significant risks; and reduce risk below the determined level of significance.

The "Hot Spots" Act requires CARB to compile and maintain a list of substances posing chronic or acute health threats when present in the air. The Air Toxics "Hot Spots" Act currently identifies by reference over 600 substances which are required to be subject to the program, a portion of which must be quantified. Under Section 4432 of the California Health & Safety Code, AB2588 applies to the following:

> "(a) Any facility which manufactures, formulates, uses, or releases any of the substances listed pursuant to Section 44321 or any other substance which reacts to form a substance listed in Section 44321 and which releases or has the potential to release total organic gases, particulates, or oxides of nitrogen or sulfur in the amounts specified in Section 44322.
>
> "(b) Except as provided in Section 44323, any facility which is listed in any current toxics use or toxics air emission survey, inventory, or report released or compiled by a district. A district may, with the concurrence of the state board, waive the application of this part pursuant to this subdivision for any facility which the district determines will not release any substance listed pursuant to Section 44321 due to a shutdown or a process change."

Of the 600 substances listed under the "Hot Spots" Act, a large portion of them are also listed as HAPs under Title V of the federal CAA. Of those listed as "Substances Which Must Be Quantified" under AB2588, the Proposed Action is not expected to emit any substances which were not already identified as a HAP under Title V of the Clean Air Act. The Proposed Action would use several chemicals listed as "Substances For Which Production, Use, or Other Presence Must be Reported." Given the use and presence of these chemicals, Glamis Imperial would be expected to prepare and submit to the ICAPCD an AB2588 Emission Inventory Plan (EIP) as specified in California Health & Safety Code Sections 44300 et seq. This plan must meet the requirements of the Emission Inventory Criteria and Guidelines Regulation, California Code of Regulations Subchapter 7.6,

Sections 93300 through 93347, and outline "a comprehensive characterization of the full range of hazardous materials that are released, or that may be released, to the surrounding air from the facility." Once the EIP is approved by the ICAPCD, a complete Emission Inventory would be prepared in accordance with the requirements of AB2588. Given the limited quantities of applicable emissions as discussed above, and the remote location of the Project, exposure of sensitive populations to significant concentrations of air toxics from the Proposed Action is very unlikely. Any impacts would be below the level of significance.

Compliance with Ambient Air Quality Standards:

The principal pollutant of concern emitted by the Project is PM_{10} because of the relatively large quantity of PM_{10} emitted by the Project, the relatively low ambient air quality standard for PM_{10}, and the fact that nearly all of the Project PM_{10} emissions are from fugitive and mobile sources which are emitted throughout the Project mine and process area. (The newly adopted $PM_{2.5}$ standard is not yet applicable and, because of the lack of baseline ambient measurements, determinations of attainment for any area cannot yet be made. In addition, the techniques necessary to estimate a project's $PM_{2.5}$ emissions have not yet been fully developed, and thus an evaluation of a project's potential impacts and compliance with the new standard cannot be made.)

In order to estimate the ambient air concentrations of PM_{10} which may result from Project emissions, computer-aided dispersion modeling for the Project PM_{10} emissions was conducted (see Appendix O). The modeling was conducted with the USEPA Industrial Source Complex - Short Term (ISCST3R) dispersion model, which utilized the Trinity Consultants, Inc. Breeze "graphical front end" (IBM-PC Version 3.00, dated 96113). Using USEPA's regulatory default model options and rural dispersion parameters with elevated terrain, emissions from Project were modeled based on hourly emission rates calculated in Appendix O and summarized in Table 4.5 for all sources (fugitive, point, mobile and other) of PM_{10} within the Project mine and process area. Surface meteorological data for the year 1989 from the National Weather Surface (NWS)-operated Yuma Air Station, combined with upper-air data from the NWS-operated Tucson Upper Air Station, was used, as it provided the most readily and reasonably available meteorological data set for the modeling.

One (1) set of discrete receptors and four (4) Cartesian receptor grids were used for the modeling the emissions from the Proposed Action. Two (2) coarse Cartesian receptor screening grids were used: a 24 x 21, 1,000-meter receptor grid, centered on the Project mine and process area, which extended out over five (5) miles from the Project mine and process area boundary (and included the wilderness areas located in the vicinity of the Project mine and process area); and a 21 x 21, 250-meter receptor grid, also centered on the Project mine and process area, which extended out over one-half (0.5) mile from the Project mine and process area boundary. The single discrete receptor set consisted to two (2) groups: a set of receptors placed at approximate 50-meter intervals along the fenced Project mine and process area boundary; and individual receptor points located in areas of potential public concern outside of those areas modeled under the Cartesian receptor grids (these receptor points, and

their respective locations, are listed in Table 4.7). In addition, two (2) densely spaced Cartesian receptor grids were modeled in those areas on the Project mine and process area boundary near pollutant "highs" identified by the coarser modeling.

Table 4.7: List of Modeled, Non-Fenceline Discrete Receptor Points Locations

Receptor Point	Location (UTM)	
	Northing	Easting
Bard, California	3630500	729000
Fort Yuma Reservation Boundary - Wash	3635200	720000
Fort Yuma Reservation Boundary - NW Corner	3634850	711750
Picacho State Recreation Area	3656000	723000
American Girl Mine	3637300	707200
Glamis, California	3652500	680000
Gold Rock Ranch	3640000	700000
Picacho Mine	3649500	720200
Mesquite Regional Landfill	3655943	685581
Mesquite Mine	3658556	688788

Modeling was conducted for each of the four (4) modelable criteria pollutants (PM_{10}, NO_x, SO_2, and CO) emitted by the Project using the applicable regulatory averaging times for each pollutant. A complete discussion of the modeling conducted, including the parameters used in the model runs and a discussion of the meteorological data, is contained in Appendix O to this EIS/EIR.

The computer-calculated maximum ambient 24-hour PM_{10} concentration located at any point on or outside of the Project mine and process area perimeter fence was 30.73 $\mu g/m^3$, located on the perimeter fence near the northwest corner of the Project mine and process area. Calculated maximum annual PM_{10} concentrations were 5.7 $\mu g/m^3$, also located on the perimeter fence at a point near the northwest corner of the Project mine and process area. Both of these values are below the applicable CAAQS and NAAQS (see Table 3.7), although close to the CAAQS when the background (annual) PM_{10} concentration (either 19.0 $\mu g/m^3$ (arithmetic mean) or 17.5$\mu g/m^3$ (geometric mean)) calculated from the nearest monitored location, Gold Rock Ranch, is added. Calculated Project-generated ambient concentrations at distances greater than 3,750 meters (2.3 miles) from the Project mine and process area boundary were universally below 5 $\mu g/m^3$. Maximum ambient concentrations at receptor points on the northern boundary of the Ft. Yuma Indian Reservation, a distance of 12,000 meters (7.5 miles) from the southern boundary of the Project mine and process area, were well below 1.0 $\mu g/m^3$ (both 24-hr and annual concentrations) and would be impossible to distinguish from background ambient concentrations. Impacts from the Project at the other discrete receptors

placed at points of potential public concern were universally modeled at below 2 $\mu g/m^3$, and would likewise be impossible to distinguish from background concentrations. These impacts would be below the level of significance. However, monitoring is proposed to be required to verify that the project does not exceed the ambient air quality standards.

One-hour and annual average concentrations were modeled from the Project's estimated emissions of NO_X. However, as indicated in Table 3.7, both the CAAQS and NAAQS are for concentrations of the NO_2 portion of NO_X. In order to reasonably predict the Project's compliance with the CAAQSs and NAAQSs for NO_2, the NO_2 fraction of ambient NO_X was estimated utilizing the USEPA's "Ozone Limiting Method." Using this method, the highest estimated 1-hr concentration of NO_2 from the Project at any point on or outside of the perimeter fence was 0.24 ppmv, less than the CAAQS of 0.25 ppmv (250 ppbv). The highest annual average ambient NO_2 concentration resulting from the Proposed Action was 0.0116 ppmv, much less than the NAAQS of 0.053 ppmv (53 ppbv), this at a point well within the fenced boundary of the Project mine and process area. Ambient concentrations modeled at the other discrete receptors placed at points of potential public concern were universally at or below 0.01 ppmv (10 ppbv). These impacts would be below the level of significance. A complete discussion of the "Ozone Limiting Method," as well as the results of the NO_X modeling conducted, is included in Appendix O.

The highest modeled 1-hour SO_2 concentration, at a point near the center of the Project mine and process area, was 494 $\mu g/m^3$, well below the CAAQS of 655 $\mu g/m^3$. All modeled concentrations at points accessible to the public, at or beyond the boundary of the Project mine and process area, were universally less than 150 $\mu g/m^3$. The modeled 3-hour high, at a point near the center of the Project mine and process area, was 264 $\mu g/m^3$, well below the secondary NAAQS of 1,300 $\mu g/m^3$. All modeled SO_2 concentrations at points accessible to the public were universally below 100 $\mu g/m^3$, well below the secondary NAAQS. The modeled 24-hour SO_2 high, at a point near the center of the Project mine and process area, was 61 $\mu g/m^3$, below both the CAAQS and NAAQS. Calculated 24-hour SO_2 ambient concentrations at distances greater than 3,750 meters (2.3 miles) from the Project mine and process area boundary were universally below 10 $\mu g/m^3$. The highest modeled annual average, at a point again near the center of the Project mine and process area, was less than 22 $\mu g/m^3$, well below the annual NAAQS. These impacts would be below the level of significance. A complete discussion of the modeling conducted for SO_2 emissions from the Project is contained in Appendix O.

The results of the CO model indicate a maximum 1-hour high, at a point near the center of the Project mine and process area, of 2,501 $\mu g/m^3$, well below both the 24-hour NAAQS and CAAQS. In addition, all calculated 1-hour ambient concentrations beyond the Project mine and process area boundary were universally below 1,500 $\mu g/m^3$. The results of the 8-hr average model shows a maximum modeled high, at a point again near the center of the Project mine and process area, of 993 $\mu g/m^3$, well below both the annual NAAQS and CAAQS for CO. All modeled concentrations at points accessible to the public, beyond the Project mine and process area boundary, were universally below 500 $\mu g/m^3$, well below both the annual NAAQS and CAAQSs for CO. These

impacts would be below the level of significance. A complete discussion of the modeling conducted for CO emissions from the Project is contained in Appendix O.

Deposition and Depletion of Suspended Particulate Matter

Deposition of lofted particulate matter from Project operations is expected to occur on and around the Project area. The rate at which particulate matter settles out from the atmosphere is a function of its gravitational settling velocity. Larger particles (those greater than 30 microns in diameter) have sufficient mass to overcome turbulent eddies, and as such settle out much more quickly than smaller particles. In order to evaluate the quantity of material potentially deposited on nearby surface and flora in the area, the emissions of total suspended particulates were modeled using the ISCST3 model. The EPA model has algorithms which simulates the effects of dry and wet deposition of particulates on the surface due to the processes of gravitational settling and turbulent diffusion. The depositional velocity is a function of the meteorology and surface conditions near the source, but is independent of the distance from the source.

In modeling the deposition of particulate matter, model settings identical to those used for the criteria pollutant modeling were used: EPA's regulatory default model options, rural dispersion parameters, elevated terrain, etc. In addition, the dry deposition option was enabled. Also, consistent with earlier runs, the Yuma/Tucson meteorological data set was used. A radial receptor grid, consisting of eight (8) radii with 30 rings spaced at 100-meter intervals, roughly centered on the Project mine and process area, and extending approximately 2.0 kilometers beyond the Project mine and process area boundary, was used. Given the high gravitational settling velocity of particulate matter greater than 30 microns, only suspendable particulate matter (those less than 30 microns in diameter, or TSP) were modeled using the same model source parameters as were used in the modeling performed for impacts from PM_{10}, and using calculated annual average emissions of TSP. In addition, the model conservatively assumed that no wet deposition occurred, that no depletion or removal of mass from the plume occurred, and that deposited particulate matter was not re-suspended as a result of additional turbulence or eddies.

The modeled annual average deposition values calculated at all points beyond the Project mine and process area boundary were less that six (6.0) grams per square meter (g/m^2). At all points greater than 0.5 kilometers from the Project mine and process area boundary, the annual average deposition was less than 2.0 g/m^2. The highest amount of deposition (24.1 g/m^2) occurred at a receptor point located near the center of the Project mine and process area, and the amount of deposited material decreased rapidly as the distance from the source increased. A complete discussion of the deposition modeling conducted for the Project is contained in Appendix O. These impacts are not considered significant in regards to their air quality impacts (see above); the effects on vegetation are discussed in Section 4.1.5.2.

Exposure of Sensitive Populations:

Project air pollutant emissions would produce modest increases in the annual average ambient concentrations of both criteria air pollutants and HAPs in the immediate vicinity of the Project mine and process area, well below any applicable threshold for exposure of sensitive populations. In addition, the Project mine and process area is far removed from any resident population, sensitive or otherwise, which could be exposed to any significant, long-term increase in the ambient concentrations of either criteria air pollutants or HAPs. Transient populations (i.e., recreational visitors) could be temporarily exposed to slightly higher level concentrations, although again these ambient air concentrations would be well below any appropriate threshold exposure level.

Other Air Quality Related Health Concerns:

Coccidioidomycosis ("valley fever" or "desert fever") is caused by an infection from the fungus *Coccidiodes immitis*. Spores of this fungus are endemic in the uppermost few inches of the soil of those areas where the disease occurs (CDHS No Date). Spores are carried into the air on dust, particularly during dust storms, and infection is caused by inhalation of dust carrying the spores. The California Department of Health Services (CDHS) indicates that:

> "Nearly everyone living for many years in areas where coccidioidomycosis occurs becomes exposed to and infected by the fungus that causes the disease... most people never get sick, and ... only two out of every 1,000 individuals infected develop severe illness.... Even the mildest 'attack' of coccidioidomycosis confers lifelong immunity." (CDHS No Date)

Although much of Arizona (including Yuma), portions of San Diego County, and northern Mexico have been established as endemic areas for the disease, Imperial Valley has not been designated as an endemic area for *coccidioidomycosis*. The Imperial County Department of Health Services, Division of Environmental Health (ICDHS-DEH) has indicated that there are no recorded cases of valley fever in Imperial County (Personal Communication, Thomas Wolf, ICDHS-DEH, May 5, 1997).

Assuming that the area of the Proposed Action is endemic for the disease, only the top few inches of soil would be expected to contain the spores (Personal Communication, Dr. C. Talbert, Kern County Health Department, June 6, 1997). This layer of soil would be removed or buried during the first days of construction activity in any particular area, so that any exposure to dust-containing spores would be limited to those times when construction in new areas was initiated. Although this is not expected to result in a significant effect, a mitigation measure is proposed to reduce the effect further.

4.1.4.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.4-1: Chemical dust suppressant treatments, in combination with water sprays, shall be applied to the haul and maintenance roads within the Project mine and process area to minimize the generation of fugitive PM_{10}. Only chemical dust suppressants acceptable to all appropriate agencies shall be applied, and the application rates and frequencies, for both the dust suppressant and water, shall be consistent with the guidance of the manufacturer to achieve optimal suppression of dust. Dust suppressant and/or water shall be applied no less than twice per day on days without precipitation unless road surface moisture is documented as sufficient to achieve maximum suppression of fugitive dust emissions without the additional dust suppressant or water.

- 4.1.4-2: Project employees, contractors, and visitors shall be advised of the need to adhere to speed limits to minimize the generation of fugitive dust. Applicant shall develop and implement appropriate measures to strengthen compliance with posted speed limits to prevent the generation of fugitive dust.

- 4.1.4-3: Shrouding of the lime discharge to the ore trucks, or equivalent RACM for these fugitive PM_{10} emissions, shall be implemented and maintained.

- 4.1.4-4: Water sprays or dust suppressants (chemical treatments acceptable to all appropriate agencies) shall be applied to Indian Pass Road from its intersection with Ogilby Road to the boundary of the Project mine and process area with sufficient frequency to minimize the emissions of fugitive PM_{10} from Project traffic on Indian Pass Road.

- 4.1.4-5: All disturbed surfaces no longer needed for project activities shall be reclaimed as soon as practical to minimize fugitive PM_{10} emissions from wind erosion.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.4-6: All permits required by the ICAPCD shall be obtained, and all operations conducted in compliance with the conditions of these permits.

- 4.1.4-7: All fuels used at the Project shall conform to the CARB low-sulfur requirements in order to minimize SOx emissions from Project-related vehicular activities.

<u>Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts</u>:

No mitigation measures are proposed or recommended.

<u>Other Mitigation Measures</u> (These are measures which may further reduce the impacts of certain effects which are below the level of significance without mitigation):

- 4.1.4-8: Appropriate measures, such as water sprays, dust suppressants (chemical treatments acceptable to all appropriate agencies), or reduced operating speeds, shall be applied to all activities which disturb the top foot of soil in any areas during construction and reclamation activities to minimize emissions of fugitive PM_{10} which may contain *Coccidiodes immitis* spores. Project employees, contractors, and visitors shall be advised to use appropriate precautions regarding the inhalation of dust while in the Project area during the initial construction/reclamation phases to minimize exposure to *Coccidiodes immitis* spores.

- 4.1.4-9: Applicant shall, in consultation with the ICAPCD, establish and maintain one (1) meteorological monitoring station (for wind speed and wind direction) and two (2) PM_{10} monitoring stations (6-day high volume samplers) to monitor project the ambient concentrations of PM_{10} which may be generated by Project activities. It shall be the intent of the two (2) PM_{10} monitors to be located in generally an upwind and downwind arrangement and operated simultaneously to provide information on the Project's effects on ambient PM_{10} concentrations. Should the monitoring show that Project operations may be contributing to a significant increase in ambient PM_{10} concentrations, then the Applicant shall review its procedures for reducing PM_{10} emissions and recommend to the ICAPCD methods which could be applied to reduce these emissions sufficiently to eliminate the significant increase.

4.1.4.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

Project emissions of criteria air pollutants and HAPs would produce increases in the ambient concentrations of both these air pollutants in the immediate vicinity of the Project mine and process area during the life of the Proposed Action. Application of the measures proposed as part of the Proposed Action would prevent impacts to air resources from reaching or exceeding the level of significance.

4.1.5. Biological Resources

This assessment of the effects of the Project on biological resources is based on the findings described in several biological technical investigation reports of the area of the Proposed Action which are appended to this EIS/EIR as Appendices F, G, H, I, J, and K. A summary of the findings

of the biological surveys is provided in Section 3.5.6.2. In addition, the findings of the Biological Assessment of the anticipated effects of the Project on the federal and state listed and proposed biological resources in the Project area, prepared on behalf of the BLM (Rado 1997) and submitted to the USFWS, have been summarized in this assessment, and the recommended mitigation measures provided in the Biological Assessment have been integrated into measures provided in this EIS/EIR.

4.1.5.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

To determine the potential significance of the effects of the Proposed Action on biological resources, it is necessary to consider the relative importance of the identified biological resources in the vicinity of the area of the Proposed Action and the degree of potential Proposed Action-related impacts on these respective resources. As discussed in the regulatory framework for biological resources section of this EIS/EIR (Section 3.5.1), factors utilized to determine the relative importance of the biological resources in the vicinity of the Proposed Action are, in part, based on species and habitats afforded protection under both the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA), as well as BLM sensitive species, and other species of concern, collectively referred to as special-interest species for the purposes of this assessment (see Section 3.5.1).

Based upon NEPA and CEQA guidelines, and commonly accepted criteria, a project would normally be considered to have a significant effect on biological resources if it could:

- Substantially affect a rare or endangered species of animal or plant or the habitat of the species;
- Interfere substantially with the movement of any resident or migratory fish or wildlife species; or
- Substantially diminish habitat for fish, wildlife, or plants.

4.1.5.2. Impacts of the Proposed Action on Vegetation and Plant Habitat

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to assess the effects of Project dust which may settle on vegetation.

The Project would impact vegetation and plant habitat primarily through direct destruction of plants by surface disturbance during construction of the mine and ancillary facilities. An estimated 1,362 acres of surface disturbance would result from the Proposed Action from the development of the mine pits, heap leach pad, waste rock stockpiles, soil stockpiles, process ponds, haul roads and access road realignment, drainage diversions, ground water well field and pipeline, electrical power

lines, and other ancillary facilities. The surface locations of these facilities are identified on Figure 2.1 and Figure 2.2, and the surface acreage disturbed by these activities is listed in Table 2.1.

Surface disturbance would occur incrementally throughout the early life of the Project as individual pits are mined and waste rock stockpiles, soil stockpiles, and process facilities are expanded. Plant habitat would be lost as result of: initial surface blading of vegetation, stockpiling of soil and waste rock, and construction of surface facilities and access corridors; crushing or damage to vegetation as a result of heavy equipment use and vehicle use and parking; periodic geological survey activities; and the use of heavy equipment during reclamation activities. Vegetation existing in the areas of surface disturbance would be destroyed or damaged as a result of removal, crushing, entombment, soil compaction, or root damage.

A total 1,302 acres of surface disturbance would occur within the Project mine and process area, of which an estimated 1,215 acres of the sparse, widely-distributed shrub/scrub vegetation habitat, dominated by creosote bush, characteristic of the upland areas within the Project mine and process area, would be affected. The remaining area of surface disturbance, approximately 87 acres, would impact the shrub/tree vegetation (i.e., microphyll woodland vegetation) habitat characteristic of the primary and secondary washes within the Project mine and process area. As discussed in Section 3.5.6, approximately 2 acres microphyll woodland vegetation habitat within the Project ancillary area and approximately 1 acre of microphyll woodland vegetation habitat in the overbuilt 92 kV/34.5 kV transmission line corridor would be subject to surface disturbance.

Vegetation and plant habitat recovery is a function of the type and degree of soil disturbance. Disturbed or compacted soils associated with construction or human activity may take longer to recover than soils disturbed by natural disturbances (i.e., such as flooding), in part because seeds, and perhaps related symbionts (e.g., rhizobial bacteria), may no longer be present (Virginia and Bainbridge 1987). Revegetation strategies would be implemented to reduce the time involved for natural plant establishment on land disturbed by the Proposed Action. Examples of strategies in desert revegetation include soil preparation (scarification and topsoil restoration), reseeding, transplantation, and plant protection (see Section 2.1.11, or Appendix A, Reclamation Plan). Application of these strategies within the Project area would continue during the life of the revegetation program under the Proposed Action.

As discussed in the Reclamation Plan, the revegetation program has been developed based upon experience gained from revegetation efforts at the Picacho Mine and information provided by qualified experts on desert flora and revegetation. When the measures discussed in the Reclamation Plan are successfully implemented, the effects of surface disturbance from mine construction and operations on the vegetation and plant habitat within the area of the Proposed Action would be below the level of significance.

Project mining activities and vehicular traffic would affect vegetation and plant habitat within the immediate vicinity of the Project area by increasing the amount of airborne particulate deposition

onto vegetation surfaces (see Section 4.1.4.2). Experiments currently underway in other parts of the California desert have demonstrated that the short-term effects of dusting may cause lowered primary production in desert plants due to reduced photosynthesis and decreased water-use efficiency. No long-term effects were detected in creosote bushes that were exposed to periodic acute heavy dust deposition along an unpaved road. Dusted creosote recovered its normal canopy by shedding dusted leaves and producing new shoots in response to seasonal rainfall (Personal Communication, S. Ahmann, U.S. Army National Training Center, June 6, 1997). The projected average annual particulate deposition onto vegetation outside the boundaries of the Project mine and process area would be less than 6.0 g/m^2 and would not exceed 4.0 g/m^2 in areas further than 0.5 km from the Project mine and process area boundary. Further, the potential effects on vegetation from dust would be reduced by natural occurrences of wind and infrequent precipitation which would remove some of the accumulated dust. With the implementation of the fugitive dust reduction measures contained in the Proposed Action, the effect of dust from the Proposed Action on vegetation and plant habitat would be below the level of significance.

Moisture available from watering of roads and other traffic areas for dust suppression during construction and mining activities could result in a temporary increase in some opportunistic plant species immediately adjacent to active roadways or other watered surface areas. Similarly, new low spots or drainage areas where water could pond or accumulate within the active portions of the Project mine and process area could result in the introduction of salt cedar, introduced species or other noxious weeds. Salt cedar could also invade moist pit areas following the completion of active mining activities where water may accumulate; however, these conditions are not expected to exist following the completion of mining (see Section 4.1.3.2.2). Seasonally moist areas within the remnant East Pit (or West Pit, if mining is terminated prior to the commencement of backfilling) could result in small areas (estimated at less than 1 to 2 acres of pit bottom) in which salt cedar growth might be supported (Personal Communication, Samuel A. Bamberg, Ph.D., Bamberg and Associates, April 25, 1996). The Proposed Action includes measures to actively control introduced plant species during and following active operations. The resulting impacts would be below the level of significance.

There would be a potential for impacts on vegetation and plant habitat due to the transport of hazardous chemicals to the Project area via public highways and access roads. The probability of hazardous chemical spillage occurring due to a transport accident is considered low, but the potential for occurrence cannot be entirely eliminated. The preventative and corrective measures discussed in Section 4.1.12.3 would reduce the effects of the potential risk to vegetation and plant habitat resulting from spills of hazardous chemicals being transported to the Project area to below the level of significance.

Up to 1,200 afy of ground water would be produced from the Project ground water well field for use in mining operations. The static elevation of the ground water in the alluvial production reservoir has been measured at 540 feet below ground surface (WESTEC, Inc. 1996a). The water table is far below the depth that surface vegetation could be utilizing the ground water; therefore, anticipated

drawdown and lowering of the ground water elevation as a result of the proposed ground water production would not impact surface vegetation or plant habitat.

Microphyll vegetation habitat exists in the wash systems down topographic gradient of the Project mine and process area (see Figure 3.16). Concern exists that diversions of the ephemeral drainages around the mine facilities would change the flow of water through the drainages feeding this vegetation habitat in the downgradient wash systems. There is also concern that these hydrologic changes to ephemeral drainages would increase erosion or affect fluvial processes in the washes, resulting in increased sedimentation or changes in the quality of water flowing through the Project area. Construction of facilities within the Project mine and process area would also eliminate the uppermost portions of some small drainages, reducing the amount of runoff which may flow down the remaining channel and, thus, be available to the channel vegetation immediately downstream.

Under the Proposed Action, storm waters in the major ephemeral drainages would either be allowed to flow naturally through the Project area, or would be diverted into channels around the Project facilities and returned to the same natural watercourse downgradient of the Project mine and process area. Each of the diversion channels would be designed to channel the surface flow back into the same major downstream ephemeral drainages from which the flow originated (see Section 2.1.9.7). The diversion channels through the Project mine and process area would be built to approximate the original drainage system in both gradient and channel geometry to prevent erosion, and would be revegetated with microphyll vegetation to establish the same type plant habitat. Major Project facilities have been located to minimize the number and amount of small, ephemeral tributaries which may have their upper reaches eliminated. These Project design measures would minimize the effects on downstream vegetation and plant habitat from any potential changes in ephemeral stream flow and fluvial processes to below the level of significance.

4.1.5.2.1. Impacts to Threatened or Endangered Plant Species

No federal or California listed, proposed, or special status plant species were observed during the botanical surveys of the Project area or overbuilt 92 kV/34.5 kV transmission line corridor. Based on the findings of the surveys and prior database records, no listed, proposed, rare or special status plants would be affected by this Proposed Action.

4.1.5.2.2. Impacts to BLM Sensitive Plant Species and Habitat

One BLM sensitive plant species, fairy duster, was observed along the edges and banks of the smaller (2- to 8-foot wide) ephemeral drainages within the Project mine and process area and in ephemeral drainages throughout the vicinity of the Project area. Individual fairy duster plants would be destroyed and their seed bank potentially lost (i.e., the dormant seeds left by previous years' plants would be buried) as a result of the proposed grading and development activities within the Project mine and process area. Fairy duster occurs over a large geographic area, including the Colorado, eastern Mojave, and Sonoran Deserts. Based on surveys, an estimated 500+ individual plants occur

within the Project mine and process area. Since most of the smaller ephemeral drainages in the Project mine and process area would be disturbed as a result of Project construction, all of this habitat, and essentially all of these fairy duster plants, would be lost. However, the species is locally common, and can and would recolonize in washes previously disturbed by mining operations (Environmental Solutions 1987). Native seeds, including fairy duster, would be collected from wash soils for use during reseeding during reclamation activities (see Section 2.1.11.1), thus replacing the communities lost during Project construction. The impact resulting from the loss of individual fairy duster plants, and fairy duster habitat, within the Project area is considered to be below the level of significance.

4.1.5.2.3. Impacts to CNPS List 4 Species and Habitat

One CNPS List 4 ("watch" list) species, the winged cryptantha, was observed within the Project area. This species was reported to exist in low numbers along the banks of the larger ephemeral drainages. Fewer than 60 individual plants were estimated to exist within the Project mine and process area (Rado 1997). These plants would be destroyed and their localized seed bank and habitat within the Project mine and process area would be potentially lost as a result of surface disturbance during mine construction. This species is widespread in distribution, ranging from the southeastern desert in California into Arizona and Nevada, but it is typically encountered in low densities and numbers of individual plants. The CNPS List 4 status indicates that these plants are not "rare" but are sufficiently uncommon that their status should be monitored. Native seeds, including the winged cryptantha, would be collected from wash soils for use during reseeding during reclamation activities (see Section 2.1.11.1), thus replacing the communities lost during Project construction. Given the current status and the distribution of the winged cryptantha, the impact from the loss of the observed plants and habitat within the Project area would be below the level of significance.

4.1.5.3. Impacts of the Proposed Action on Wildlife

4.1.5.3.1. Impacts on Wildlife Habitat

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to increase the off-site land acquisition compensation ratio for disturbed microphyll woodland habitat from 1:1 to 3:1.

The total area of surface disturbance resulting from Project construction and operation within the Project mine and process area would be 1,302 acres. This would include approximately 1,215 acres of desert scrub habitat and approximately 87 acres of microphyll woodland habitat. The loss of wildlife habitat, particularly the loss of microphyll woodland habitat, would directly or indirectly displace resident birds within or near the Project mine and process area. The Project would also result in an incremental loss of foraging habitat for wildlife and/or migratory species such as bats and raptors. The effects of the loss of habitat from the Project on wildlife would continue over the life of the Project, and some of the effects would continue for an extended period following final

reclamation. Wildlife would eventually return to the Project mine and process area as vegetation reestablishes and disturbed surfaces are reclaimed or recover. However, the projected period before conditions return to an approximate pre-Project status with respect to wildlife carrying capacity may exceed several decades following completion of the active life of the Project (Rado 1997). To compensate for this reduction in carrying capacity, the Proposed Action contains many measures (which are also contained in Mitigation Measures 4.1.5-7 through 4.1.5-26) to reduce the impacts on microphyll woodland habitat and associated wildlife which use this habitat; reduce the long-term impacts of the Proposed Action; provide off-site compensation for these habitat losses; and enhance reclamation. These are each discussed below, as is the level of significance for each.

As discussed in Section 3.5.6, the CDFG considers microphyll woodland to be a sensitive habitat. It is considered second only to riparian habitat in wildlife diversity in the desert area, and it is considered a particularly important habitat component to deer and other wildlife species (Personal Communication, Nancy Andrew, CDFG, 1996). CDFG has a policy of requiring replacement of habitat "on-site" and "in kind" when possible for wetland habitat impacted as a result of proposed projects. This means that sensitive wetland habitat lost within a proposed project area as a result of proposed project activities would be required to be replaced by the project applicant with the same type and quality of sensitive wetland habitat somewhere within the project area when possible, or outside of the project area when on-site replacement is not possible. Wetland habitat would not be impacted by the Imperial Project, but the CDFG also adapts this wetland habitat policy to other habitats which they consider sensitive, such as microphyll woodland, when evaluating measures to mitigate the biological effects of projects which may require Stream Alteration Agreements (Personal Communication, Lilia Martinez, CDFG, 1996).

Surface disturbance from the Imperial Project would result in the destruction of approximately 87 acres of microphyll woodland habitat within the Project mine and process area. Based on the work done at the Picacho Mine, it is apparent that microphyll woodland vegetation can be re-established (Bamberg and Hanne 1997; see also Attachment B to Appendix A, Reclamation Plan). The estimated time for recovery of a microphyll woodland, that is, for establishment of trees and shrubs to a density approaching the natural wash vegetation, is estimated at five (5) years; for recovery to a condition approaching maturity is estimated at twenty (20) years. Plant succession and changes in structure would continue for approximately 50 years for trees (up to 30 feet). The expected survival of ironwood seedling transplants after one (1) year, based on Picacho experience (December 1995 to December 1996), is approximately 80 percent (Bamberg and Hanne 1997). Studies are underway on ironwood propagation at the Picacho Mine working in conjunction with the Desert Legume Program at the University of Arizona. Other typical wash plant species (palo verde, brittle bush, saltbush, sweetbush, desert mallow, wire lettuce, and annual grasses and forbs) have been successfully grown from seed collected in washes (Bamberg 1997b; see Appendix G).

Measures are incorporated into the Project design to minimize the area of microphyll woodland habitat disturbed by the Project to 87 acres and to mitigate the adverse effects of the Project on microphyll woodland habitat. Reclamation measures would result in reestablishment within the

Project mine and process area of approximately one-half (½) of these 87 acres of disturbed microphyll woodland habitat. Additional Project measures intended to compensate for the loss of microphyll woodland habitat from the Project include providing for the acquisition of off-site private lands containing microphyll woodland habitat at a ratio of 3:1 for all of the acres of microphyll woodland habitat disturbed within the Project mine and process area, reclamation of previously disturbed public lands not associated with the Proposed Action to be identified and approved by the BLM (see Section 4.1.5.4).Vegetation, wildlife and ecosystem processes are also expected to benefit from off-site compensation of upland habitat for desert tortoise and microphyll woodland habitat. Compensation lands that are in close proximity to the Project mine and process area, of equal or better habitat quality, and of similar vegetation community, elevation, hydrology, wind patterns, and substrates, would provide the greatest benefit. Additional measures to mitigate and compensate for the impacts of the Proposed Action on the ephemeral stream channels and associated microphyll woodland habitat are provided in the required Stream Alteration Agreement between the Project Applicant and the CDFG. A draft Stream Alteration Agreement has been prepared and is currently under negotiation between the CDFG and Glamis Imperial (Glamis Imperial 1997; see Section 4.1.5.4). With the implementation and success of these measures proposed as a part of the Proposed Action or required by regulation, the effect of the Proposed Action on microphyll woodland habitat within the Project mine and process area would be below the level of significance.

Diversions of the major surface drainages through constructed channels around the Project facilities would continue to provide the same flow and quality of water into these major wash systems downgradient of the Project mine and process area as exists prior to mine construction. No substantial impact on wildlife habitat or species in the major wash system downgradient of the Project mine and process area is expected. Similarly, wildlife habitat in the Algodones Sand Dunes foothill "pockets" of microphyll vegetation downgradient of the mine would not be affected by the Project. Although some minor, ephemeral tributaries of the major channels would be "truncated" by the construction of the waste rock stock piles and the heap, thereby reducing the amount of water which may flow into these small tributary channels, the amount of reduction in water flow in the major channels would be imperceptible and would not result in any significant effects.

The through-flowing surface drainages would be located as close to their original courses as reasonably possible in comparably-sized channel(s) which would tie into the original wash systems downgradient of the diversion point. As discussed in Section 4.1.5.2, these diverted drainages would be revegetated with microphyll vegetation to reestablish microphyll woodland habitat. However, as a result of Project construction, the affected microphyll woodland habitat in the smaller drainages which are not diverted cannot be reestablished within the Project mine and process area, and thus there would be a net reduction of microphyll woodland habitat in the Project mine and process area as a result of the Project. However, with implementation of the elements of the Proposed Action to compensate for the permanent loss of microphyll woodland habitat within the Project mine and process area, this loss would be less than significant.

As discussed in Section 3.5.6, approximately 2 acres of microphyll woodland habitat within the Project ancillary area and approximately 1 acre of microphyll woodland habitat in the overbuilt 92 kV/34.5 kV transmission line corridor are expected to be impacted by surface disturbance associated with the Proposed Action within these areas. The proposed removal of Project facilities and the other reclamation activities contained in the Proposed Action to be completed as part of final reclamation within the affected portions of the Project ancillary area and the overbuilt 92 kV/34.5 kV transmission line corridor are expected to fully reclaim the disturbed microphyll woodland habitat in these two (2) areas. These impacts would be below the level of significance.

Several small, isolated, ephemeral water seeps located northwest to southwest of the Project ground water well field area, in the vicinity of or adjacent to the Algodones Sand Dunes, likely provide seasonal water and habitat for wildlife which is otherwise limited in this region. As indicated in Section 3.3.1, because Project ground water production would be from a different aquifer than these seeps, it would not impact the shallow source of the seeps, and would not impact biological resources which may be supported by these seeps.

4.1.5.3.2. Impacts on Wildlife and Wildlife Movement

Wildlife species which inhabit, move through, or forage within the approximately 1,340 acres of surface area to be disturbed within the Project area would be subject to increased mortality or displacement as a result of the Proposed Action. Increased mortality would result from direct physical impacts or entombment during construction or processing activities, or result in indirect mortality from stress or increased predation pressure resulting from displacement into off-site areas. Individual animals could also be subject to injury or mortality during on-site blasting and continued mining operations and geological survey activities, and increased mortality from project-related stresses, including night lighting, in the vicinity of the Project mine and process area. Noise-sensitive species would be expected to avoid both the Project area and neighboring areas over the life of the Project, but would be expected to return when noise generating operations are discontinued. Similarly, species intolerant of surface disturbance and human activities would also be expected to avoid the Project area and neighboring areas over the life of the Project. Because of the substantial amount of alternative habitat available, these impacts to wildlife and wildlife movement are not considered significant.

Some wildlife species might come under increased pressure from opportunistic predators (i.e., ravens, coyotes and kit foxes) attracted to the Project area by increased water availability, refuse, or noise. In addition, during the life of the Project the movements of some wildlife through the Project mine and process area would be restricted as a result of the perimeter fence, the constructed Project features (such as the pits, waste rock stockpiles, and heap), or the general level of human presence and activity. Because of the substantial open space surrounding the Project mine and process area, these effects are not considered significant.

Over the life of the Project, additional injuries and mortality to wildlife would be expected to result from direct impacts with motor vehicles commuting to the Project area and other equipment traveling to and from the Project mine and process area and the ancillary area. Experience in other remote areas suggests that measures to reduced speeds on public roads, such as posting reduced speed limits, to minimize inadvertent vehicle impacts with wildlife are impractical to enforce. Individual animals attracted to the Project area from available water sources in the area may also be injured or killed by vehicles on the roads inside the Project mine and process area and in the Project ancillary area. The realignment of a portion of Indian Pass Road and creation of new roads to ancillary facilities would create a temporary impact on the movement of wildlife in the area, particularly for mule deer, coyotes, foxes, and badgers. These species are expected to acclimate to the new roads, but there may be some permanent displacements and readjustments of home ranges, even though the road realignment and ancillary area access roads are temporary. These impacts to wildlife and wildlife movement from roads and vehicles are not considered significant.

Wildlife could be affected by the hazardous chemicals used by the Project. There would be a potential for impacts to wildlife due to the transport of hazardous chemicals to the Project area via public highways and access roads. The probability of hazardous chemical spillage occurring due to a transport accident is considered low, but the potential for occurrence cannot be entirely eliminated. The preventative and corrective measures discussed in Section 4.1.12.3 would reduce both the potential risk of and effects to wildlife resulting from spills of hazardous chemicals being transported to the Project area to below the level of significance. Wet liners on ponds could attract shorebirds because they mimic wetland shores, which could result in injury or death from the ingestion of toxic chemicals in the ponds. Individual animals could also be subject to drowning in mine process fluid impoundments and increased mortality from exposure to process chemicals within the solution ponds. The Proposed Action includes measures to prevent wildlife from entering process ponds, and the residual effects would be below the level of significance.

The natural tinajas and wildlife guzzlers installed to provide artificial sources of water would not be affected by the ground water withdrawal at the Project ground water well field area, and the wildlife supported by these water sources would not be affected.

An existing section of 34.5 kV transmission line would be overbuilt with a 92 kV/34.5 kV transmission line, and a new transmission line would be constructed along Indian Pass Road, to provide electrical power to the Project mine and process area. Temporary and short-term impacts on wildlife and wildlife movement would occur during pole placement and line stringing activities as a result of minor surface disturbance and human presence. The transmission lines could also increase the availability of potential perch sites for bird predators in the area, which could result in an increase in predatory pressure on wildlife species comprising the prey base for predatory birds in the area. The transmission lines would also increase the potential for collisions or electrocutions of raptors and other bird species. However, all of these impacts would be below the level of significance.

The Proposed Action would result in the excavation of three (3) open pits, two (2) of which would be backfilled with waste rock. The East Pit would remain as an open approximately 198-acre excavation which would remain as a slight long-term impediment to the movement to some wildlife species. Individual terrestrial wildlife species could become injured or killed by falls within this open pit, although as part of the Proposed Action a rock rubble barricade would be constructed around the open pit to prevent vehicular access and limit pedestrian and wildlife access, and haul roads within the open pit would be regraded such that wildlife or humans would still be able to use them to exit the open pit should they pass beyond the barricade. Ground water could accumulate in the bottom of the open pit and form a pit lake, although this is not likely, and measures are incorporated as part of the Proposed Action to reduce the possibility further. Although any water in a pit lake would not be injurious to wildlife (see Section 4.1.3.2.2), wildlife species coming to drink could be exposed to predators which may use the pit area as a place to wait for prey. The Proposed Action also includes measures to offset the net reduction of habitat as a consequence of the open pits. The effects of the Proposed Action on general wildlife species and wildlife movement would be below the level of significance.

If mining is suspended or terminated prior to backfilling of the West Pit, the West Pit would remain as an open excavation and would remain as a long-term impediment to the movement to some wildlife species. Individual terrestrial wildlife species could become injured or killed by falls within this open pit. Ground water could accumulate in the bottom of the open West Pit and form a pit lake, although this is not likely, and measures are incorporated as part of the Proposed Action to reduce the possibility further. Although any water in a pit lake would not be injurious to wildlife (see Section 4.1.3.2.2), wildlife species coming to drink could be exposed to predators which may use the pit area as a place to wait for prey. These effects of the open West Pit on general wildlife species and wildlife movement would be above the level of significance.

4.1.5.3.3. Impacts to Threatened or Endangered Wildlife Species

One species listed on both federal and California threatened species lists, the desert tortoise, would be directly impacted by the Project. Two (2) other currently listed or proposed wildlife species (peregrine falcon and Gila woodpecker), which were either documented during the surveys or previously recorded in the Project area, are also discussed below, but would not likely be impacted by the Proposed Action.

<u>Desert tortoise</u>: The habitats within the Project area are unclassified by the BLM with respect to desert tortoise, and the Project area has not been designated critical desert tortoise habitat by the USFWS (USFWS 1990). However, as a result of field survey documentation of the tortoise within the Project area, the Project area would be considered Category III tortoise habitat (BLM 1989). The number of desert tortoise currently present within the Project area has been estimated from review of the survey data to range between 33 and 57 individuals (Rado 1997).

Desert tortoise which occupy the Project mine and process area may be injured or killed as a result of surface disturbance during Project construction or processing activities. The surface modification activities would occur over approximately 1,302 acres and would destroy the tortoise burrows or pallets within the Project mine and process area, potentially crushing or entombing individuals. Additional tortoises may also be injured or killed as a result of heavy equipment traffic within the Project mine and process area and from impacts with vehicles commuting to and from the Project area on existing or relocated roads. Tortoise occupying areas adjacent to the Project mine and process area, or having home ranges overlapping the Project area, would be similarly affected if they wandered onto the active Project areas. A total of 1,137 acres of desert tortoise habitat within the Project mine and process area would be reclaimed. Adjacent tortoise populations may slowly recolonize this area as vegetative processes establish native habitats. A total of 165 acres, comprising the East Pit slopes, would be lost within the Project mine and process area as desert tortoise habitat after completion of Project final reclamation.

Activities and facilities ancillary to the Project mine and process area and the overbuilt 92 kV/34.5 kV transmission line corridor could also adversely affect desert tortoises. Tortoises could be injured or killed as result of construction of the ground water wells, water pipeline, or electrical transmission line within the Project ancillary area, or the constructions of the overbuilt 92 kV/34.5 kV transmission line. The water pipeline would be buried, so it would not restrict tortoise movement. Construction of the new or overbuilt transmission lines may also attract, or provide perches for, tortoise predators (i.e., ravens). Tortoise populations have been dramatically reduced in areas with higher than normal raven populations. Ravens eat juvenile and hatchling tortoises and can severely reduce recruitment to the tortoise populations. Storage ponds within the Project mine and process area or other sources of standing water and refuse could also serve to attract and increase tortoise predator populations in the vicinity of the Project area.

Following completion of mining activities, individual desert tortoises could wander into the open East Pit. While pit slopes (estimated at 50 degrees) may allow for the movement of animals, individual tortoises could become injured or killed as a result of falls or excessive predation from coyotes, kit foxes, or other species.

Desert tortoises within the Project area would also be subject to displacement either by capture and removal of individuals to locations outside the Project area, or by individuals within or near the Project area voluntarily leaving the vicinity when Project activities are initiated.

Guzzlers constructed in the vicinity of the Project area to mitigate the effects of the Project on wildlife could inadvertently trap desert tortoise and result in increased desert tortoise mortality.

Some design elements have been incorporated into the Project to minimize the effects of the Project on desert tortoise. However, prior to any additional mitigation, the effects of the Project on desert tortoise are considered significant.

Peregrine falcon: No peregrine falcons were observed during surveys of the Project area, but a few falcons have previously been recorded from the Project area. Similarly, the species has been unreported in surveys for other projects in the general area (Condor 1991, WESCO 1992; Office of Arid Lands Studies 1993; Western Resource Development 1993; BLM 1994a). Peregrine falcons are known to nest in cliff areas along portions of the Colorado River system (USBR 1996). No potential nesting sites for peregrine falcons occur in the Project area or the surrounding area. The species could potentially utilize the Project area, including the Project mine and process area, for foraging on an infrequent basis although, based on the absence of prior records, this seems highly unlikely. Project effects on the American peregrine falcon would not be significant.

Gila Woodpecker: A single Gila woodpecker was observed perched on a large ironwood tree in a large wash near the southwest corner of the Project mine and process area by a biologist in January 1995 (Rado 1995). Additional searches for this and other Gila woodpeckers were subsequently conducted but did not record the bird in the Project area. The single observation of the Gila woodpecker is believed to have been of a transient bird. The Gila woodpecker is a cavity nester known to prefer mature cottonwood and willow trees within riparian habitats not present in the Project area. The effects of the Project on the Gila woodpecker would be below the level of significance.

4.1.5.3.4. Impacts to Other Wildlife Species of Concern and Habitat

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: discuss the impacts to bats on the basis of the results of a survey of the Project mine and process area for bats; discuss the impacts to flat-tailed horned lizards on the basis of the results of a survey of the southernmost end of the overbuilt 92 kV/34.5 kV transmission line corridor for flat-tailed horned lizard or sign; provide additional assessment on Project impacts on desert deer and bighorn sheep; and discuss the effects of Project lighting on wildlife.

In addition to the listed species discussed above, the Proposed Action may adversely effect the following wildlife species of concern.

Cheeseweed owlfly: The cheeseweed owlfly has not been documented within the Project mine and process area. Since the Project occurs within the geographic range of this species, and because its host plant (creosote bush) is present, the cheeseweed owlfly could potentially occur here. If present, the cheeseweed owlfly would be subject to habitat loss associated with initial blading and grading activities. Additionally, individual cheeseweed owlflies could be attracted to night lighting during operations; although, the species is considered a poor flyer (USBR 1996). The geographic range of this species is extensive and collecting sites widely dispersed. The short flight season of adults and the indeterminate timing of adult emergence may reflect the paucity of records. Therefore, information necessary to determine the effects of the Proposed Action on the cheeseweed owlfly is unavailable. There is no substantial evidence that the Proposed Action would substantially affect the cheeseweed owlfly or its habitat; therefore, impacts would be below the level of significance.

Mitigation measures (see Section 4.1.5.4) have been incorporated into the Project design to further reduce the long-term impacts of the Project on potential cheeseweed owlfly habitat.

Chuckwalla: Marginal quality chuckwalla habitat exists over approximately one-half (½) of the Project mine and process area. A total of three (3) chuckwallas were observed during surveys of the Project mine and process area, and an estimated 25 individual chuckwallas may inhabit the Project area (Rado 1995). Chuckwallas are known to display high site fidelity and would not be expected to flee the area as a result of disturbance. As such, the chuckwallas present within the Project area could be killed or injured as a result of surface disturbance associated with mine construction and ore extraction and processing. Chuckwalla habitats are known to exist in the vicinity of Peter Kane Mountain north, Picacho Peak east, and the Cargo Muchacho Mountains south of the Project area. A large portion of the chuckwalla habitat exists within the Indian Pass Wilderness Area and Picacho Peak Wilderness Area. While the effects of the Project on the chuckwalla and chuckwalla habitat would be below the level of significance, measures have been proposed to further reduce the impacts of the Proposed Action on this species (see Section 4.1.5.4).

Flat-tailed horned lizard: There were no flat-tailed horned lizards observed within the Project area during the biological surveys of the area, and no flat-tailed horned lizard habitat exists within the Project area. Likewise, there were no flat-tailed horned lizard or flat-tailed horned lizard sign observed during the specific survey for the flat-tailed horned lizard, along the southernmost portions of the 34.5 kV transmission line to be overbuilt for the Project. Flat-tailed horned lizard habitat does exist south of Interstate Highway 8 in the proximity of the tap (origin) for the overbuilt 92 kV/34.5 kV transmission line, but Interstate Highway 8 provides a permanent barrier which would prevent lizard crossings and potential impacts to the lizard and lizard habitat south of the highway during construction of the overbuilt 92 kV/34.5 kV transmission line.

There have been no recorded sightings of flat-tailed horned lizard within ten (10) miles of the Project mine and process area and Project ancillary area. However, there is a potential that a small number of flat-tailed horned lizards may be injured or killed as a result of Project-related traffic traveling along an approximately one-mile section of flat-tailed horned lizard habit located immediately north of the junction of Ogilby Road and Interstate Highway 8. The results of the flat-tailed horned lizard surveys indicate any impacts to individual flat-tailed horned lizards or its habitat would be below the level of significance.

Loggerhead shrike: Loggerhead shrikes were frequently observed throughout the Project area during the biological surveys (Rado 1995). Shrikes are common and widely distributed in the area. Two (2) family groups were observed within the Project area during the spring breeding period, suggesting a high likelihood that nesting occurs within the Project area, but no loggerhead shrike nests were encountered during the surveys. Based on a projected density of one loggerhead shrike per 50 acres, as was observed in the alluvial plain bordering the Santa Rosa Mountains, an estimated 33 shrikes may currently use the Project area for foraging and/or nesting. During construction and mining activities within the Project area, approximately 1,340 acres of shrike habitat would be disturbed,

displacing shrikes to neighboring unmodified lands. Individual loggerhead shrike nests may be destroyed, resulting in mortality to nestling birds or abandonment of eggs if disturbance occurs during the spring breeding period. Because of the availability of substantial off-site shrike habitat, the effects of the Proposed Action on the loggerhead shrike and shrike habitat would be below the level of significance.

Black-tailed gnatcatcher: Black-tailed gnatcatchers were observed within the Project area during the biological surveys. Favored gnatcatcher areas appeared to be in secondary drainages with wash vegetation in which young ironwood and palo verde trees provide cover (Rado 1995). Gnatcatchers utilizing the Project mine and process area would be displaced to neighboring unmodified lands. Individual black-tailed gnatcatcher nests would be destroyed, resulting in mortality to nestling birds or abandonment of eggs if surface disturbance occurs during the breeding period. Because of the availability of suitable gnatcatcher habitat in neighboring areas, the effects of the Proposed Action on the black-tailed gnatcatcher and its habitat would be below the level of significance.

Sharp-shinned hawk: A single sighting of a sharp-shinned hawk occurred in the Project area during the biological surveys (Rado 1995). This species is reported to be an uncommon winter migrant through the area. Implementation of the Project would result in a small reduction of the regional foraging habitat available to migrating sharp-shinned hawks, and it could result in a minor behavior modification of individual birds that cross the Project area. Based on the low frequency in which sharp-shinned hawks are projected to utilize the Project area, and the availability of off-site foraging habitat, the effects of the Proposed Action on the sharp-shinned hawk and its habitat would be below the level of significance.

Northern harrier: Two (2) sightings of northern harriers were made within the Project area during the biological surveys (Rado 1995). The sightings were during the fall and were attributed to isolated birds presumed to have been migrating through the area. There is no northern harrier nesting habitat within the Project area. The Project would result in a small reduction of the regional foraging habitat available to migrating northern harrier, and it could result in a minor behavior modification of individual birds that cross the Project area. Based on the low frequency in which northern harrier are projected to utilize the Project area, and the availability of substantial off-site foraging habitat, the effects of the Proposed Action on the northern harrier and its habitat would be below the level of significance.

LeConte's thrasher: LeConte's thrashers were not recorded during the biological surveys, which included playing recorded bird calls during the breeding season in an attempt to elicit a response. However, prior records suggest that LeConte's thrashers may occur within the Project area (CNDDB 1996; BLM records). If present, the species would be subject to habitat loss, displacement of individuals to off-site areas, and possible disruption of breeding and nest failure. Because of the availability of substantial off-site thrasher habitat, the effects of the Proposed Action on LeConte's thrasher and its habitat would be below the level of significance.

Crissal thrasher: A single crissal thrasher was observed within the Project mine and process area during the surveys. The species is closely associated with drainages and wash "edge" vegetation. A total of about 87 acres of such habitats would be affected by Project actions. Crissal thrashers that utilize these drainages would likely be displaced into adjacent unmodified lands as a result of conversion of habitat. Depending upon timing of year, nests may also be abandoned, resulting in mortality of nesting birds and/or abandonment of eggs. Because of the availability of substantial off-site crissal thrasher habitat, the effects of the Proposed Action on the crissal thrasher and its habitat would be below the level of significance.

Vaux's swift: Vaux's swifts utilize the general area, including the Project area, during spring and fall migration. They do not nest in this region. Development may result in minor behavioral modification of migrating birds passing through the region. Mining activities would also result in a reduction of the available foraging/resting habitats for migrating birds. Because of the availability of substantial off-site swift foraging/resting habitats, the effects of the Proposed Action on the Vaux's swift and its habitat would be below the level of significance.

Golden eagle: Golden eagles were not observed during the biological surveys. Eagle nesting sites are also absent from the Project area and vicinity. The species may utilize the general area, including the Project mine and process area, for foraging. Project construction and operations within the Project area would result in the incidental loss of 1,340 acres of potential golden eagle foraging habitat. Based on the widespread availability of off-site foraging habitat for golden eagles, the effects of the Proposed Action on this species and its habitat would be below the level of significance.

Prairie falcon: Biological surveys did not document the occurrence of the prairie falcon. However, the prairie falcon has been previously recorded within the general area and could utilize the Project area and surrounding area for foraging (BLM records). Project construction and operation activities within the Project area could result in the loss of 1,340 acres of foraging habitat for prairie falcons. Based upon widespread availability of off-site foraging habitat, the effects of the Proposed Action on this species and its habitat would be below the level of significance.

Cooper's hawk: Biological surveys did not document the occurrence of the Cooper's hawk. However, the species has been recorded as a seasonal visitor in the general area and could utilize the Project area and surrounding area for foraging (BLM records). Project construction and operation activities within the Project area could result in the loss of 1,340 acres of foraging habitat for Cooper's hawk. Based on the widespread availability of off-site foraging habitats for Cooper's hawk, the effects of the Proposed Action on this species and its habitat would be below the level of significance.

Long-eared owl: Biological surveys did not document the occurrence of the long-eared owl. However, the species has been recorded as a seasonal visitor in the general area and could utilize the Project area and surrounding area for foraging (BLM records). Based on the widespread availability

of off-site foraging areas for long-eared owls, the effects of the Proposed Action on this species and its habitat would be below the level of significance.

Barn owl: Natural caves, fissures, old mine tunnels and shafts, or abandoned buildings often used for barn owl nesting are not present within the Project area. Project development would potentially result in the creation of barn owl nesting within storage sheds, maintenance buildings, or other "open" structures. Since this species has been recorded in the general area (BLM records), Project operations within the Project area would result in the potential reduction of 1,340 acres of barn owl foraging habitat. Based on widespread availability of off-site foraging habitat for barn owls, the effects of the Proposed Action on this species and its habitat would be below the level of significance.

Yuma puma: No pumas or sign were documented during surveys of the Project area. Use of the Project area by deer, a primary prey species for pumas, suggests that mountain lions may occur in the general area. Unconfirmed sightings of mountain lion in the region have been conveyed to the CDFG by hunters (Personal Communication, Rusty McBride, CDFG, 1996). Mine construction and operation activities would result in the reduction of 1,340 acres of foraging habitat potentially available to mountain lions. Associated impacts to deer could also incrementally affect the prey base for mountain lions. Based on the widespread availability of off-site foraging habitat for mountain lions, the effects of the Proposed Action on this species would be below the level of significance.

American badger: Badgers are presumed to utilize the Project area for foraging, but the actual number of badgers that may use the area is indeterminate. Previous studies of the species reported individual badgers having home ranges of 1,400 and 2,100 acres (Messick 1987). Based on the area of these home ranges, few American badgers would be expected to occupy habitat within the Project area. The Project would result in a reduction of the habitat available to badgers in the Project area, and increased noise, lighting, and traffic would likely result in behavior modifications by badgers to avoid the area. Based on the availability of off-site foraging habitat, the effects of the Proposed Action on the American badger and its habitat would be below the level of significance.

Sensitive bat species: No sensitive bat species were recorded within the Project mine and process area during the original biological surveys (Rado 1995). No mine adits, caves, or large rock crevices exist in the Project area, thereby limiting the species of bats which may day roost within the Project mine and process area. However, some bat species could roost in trees or in small rock crevices. A survey of the Project mine and process area for bats was conducted by Patricia E. Brown, Ph.D. in June 1997 (see Section 3.5.6.2). Five (5) sensitive bat species designated by the USFWS as Special Status Species and/or California species of concern (CSC) could conceivably roost, and also forage, in the Project area, including: Yuma myotis, small-footed myotis, cave myotis, occult little brown bat, and desert pallid bat. An additional six (6) Special Status Species/CSC bat species would not roost in the Project area but could use the Project area as nighttime foraging habitat, including: Townsend's big-eared bat, spotted bat, western mastiff, California leaf-nosed bat, big free-tailed bat, and pocketed free-tailed bat.

Large numbers of bats would neither be killed nor displaced by the Project. Foraging habitat would be affected, but similar habitat is widespread around the Project area. Night lighting from the Project would attract insects and could result in a net increase in bats foraging in the vicinity of the Project mine and process area. This could lead to individual bat collisions with lights or drownings in ponds. However, based on the availability of off-site day roost areas and foraging habitat, the effects of the Proposed Action on sensitive bat species and their habitat would be below the level of significance.

Mule deer: Desert deer are widely distributed throughout the Project area and surrounding area, but the deer population is reported to be low (Celentano and Garcia 1984). Deer were observed to use the northeast-southwest trending wash channels as movement corridors and to also move cross-gradient over the upland areas and across the washes in the Project area.

The Proposed Action would impact deer habitat by eliminating the use of the Project mine and process area by deer over the life of the Project, until habitat is reestablished, and would permanently eliminate the majority of the open East Pit from deer habitat. Project-related impacts to deer habitat could result in a slight net reduction in the numbers of deer that seasonally utilize the Project area, and/or that may reside in the Project area due to the availability of water in maintained guzzlers located south and also east of the Project mine and process area. Potential impacts to deer and deer habitat would include:

- The general loss of most of the Project mine and process area as foraging habitat during the life of the Project, and in particular the loss of the approximately 87 acres of microphyll woodland habitat which would be destroyed during Project construction.
- To the extent the Project mine and process area serves as deer fawning habitat, the approximately 87 acres of microphyll woodland in the washes would be destroyed as potential fawning habitat during Project construction.
- Restricted access through the Project mine and process area as a result of fencing may limit deer movement in the vicinity of the Project mine and process area. Access to three (3) big game guzzlers located east and south of the Project mine and process area boundaries would be slightly reduced.
- Noise from equipment operation, blasting activities, and human presence, as well as night lighting of the Project mine and process area facilities, would be expected to inhibit deer activity in the immediate vicinity of the Project mine and process area in the short-term; however, deer would be expected to acclimate to Project noise over time and resume utilization of the areas outside the boundaries of the Project mine and process area (Personal Communication, Nancy Andrew, CDFG, 1997).
- Vehicles commuting on roads to the Project mine and process area would increase the potential for vehicle impacts with deer and resulting injuries and mortality. If the Project results in an

approximate five (5) percent increase in traffic (see Section 4.1.11.1.2), then a proportional potential increase in traffic-related deer mortality (i.e., an increase from approximately two (2) percent to 2.1 percent) would be expected to result.

- Deer which penetrate the perimeter fence and/or process fence of the Project mine and process area would be subject to an increased potential for vehicle impact injuries and mortality and ingestion of potentially harmful process pond solutions or other chemicals stored and used within the Project mine and process area.

- Realignment of Indian Pass Road could impact migration routes, dispersal corridors and deer movement. Deer are expected to acclimate to the road realignment; however, there may be some permanent displacement.

- Water could accumulate in the East Pit (or West Pit, if not sufficiently backfilled) and attract deer to the new water source, altering the habitat for deer. Limited access to and from the pit(s) could potentially serve as an opportunity for increased predation of deer.

- Deer may become stressed if they get into the Project mine and process area, and this could reduce fawn production in does.

Because of the low density and scattered distribution of deer in the area, and the relative abundance of similar habitat in the vicinity of the Project area, the Proposed Action would not be expected to directly or indirectly impact a large number of deer. Some deer would be indirectly impacted by reduction of habitat quality through vegetation removal. Given conflicting professional opinion as to the importance of the Project area and vicinity for deer use and as fawning habitat, the specific significance of the impacts of the Proposed Action on deer and deer habitat without the implementation of those measures designed into the Proposed Action to reduce the impact and compensate for the adverse effects on microphyll woodland habitat is uncertain. However, with the implementation of these measures, impacts to deer and deer habitat are below the level of significance. Elements of the Project design which would mitigate impacts on deer include (see also those measures identified under the applicable heading in Section 4.1.5.4):

- Constructing a 6-foot high, barbed-wire topped, chain-link fence around all Project-created surface water sources within the Project mine and process area, including the heap leach pad, process facilities, and fresh water pond;

- Revegetating disturbed areas following mining activities, and including native deer forage plants as a part of this effort (subject to BLM and CDFG approval);

- Performing revegetation within the permanent diversion channels, including direct transplanting of microphyll species from disturbed drainages, planting of young seedling palo verde and ironwood and seeding with species common to the microphyll woodland habitat;

- Performing revegetation on selected adjacent drainages subject to historic damage unrelated to the Proposed Action;

- Directing diverted surface drainages back into the same major channels to maintain continuity of flow and water quality to habitat downstream of the Project mine and process area;

- Constructing a rock barrier around the remnant East Pit and back filling the pit to a level above any predicted pit lake, if necessary;

- Constructing three (3) off-site big game guzzlers at a location in the vicinity of the Project area mutually agreeable to the Applicant, the CDFG and the BLM; and

- Constructing one or more on-site big game or small game guzzlers at the conclusion of final reclamation.

Desert bighorn sheep: No bighorn sheep were observed within the Project area during the biological survey, and the Project area is not within established bighorn habitat. Natural dispersal corridors, between Peter Kane Mountain to the north and the Cargo Muchacho Mountains to the south, lie several miles to the east of the Project mine and process area, and these routes would not be directly affected by the Project activities. Although noise from Project operations, especially from blasting, may be discernable in these areas, the effect on bighorn sheep would be below the level of significance. The Project facilities may impact movement of bighorn sheep rams between mountain ranges; however, this direct route is not considered a substantial movement corridor and the impact of the Project on desert bighorn sheep movement would be below the level of significance.

4.1.5.4. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts:

- *The following measures have been incorporated into the Project design to reduce the impacts to plant and wildlife species and habitat during the active life of the Project.*

- 4.1.5-1: Applicant shall construct a fence around the entire Project mine and process area. The fence shall be constructed no less than four (4) feet in height with 3-strands of smooth wire, or equivalent. That portion of the perimeter fence constructed along the western boundary of the Project mine and process area, including all of the fenceline adjacent to Indian Pass Road (see

Figure 2.2), shall be a chain-link fence, no less than six (6) feet in height, to restrict public access to the Project mine and process area. The entire perimeter fence shall include desert tortoise exclusion fencing, in conformance with responsible agency requirements, to inhibit tortoise access to Project facilities (see also Mitigation Measure 4.1.5-40). Applicant shall construct a chain-link fence, no less than six (6) feet in height, with one (1) foot of barbed wire at the top, around the ore leach pad, process facilities, and fresh water pond to further restrict wildlife from accessing these facilities. Applicant shall routinely inspect and repair the fences, as necessary. Applicant shall document any deer or other wildlife mortalities observed within the Project mine and process area, shall monthly report such mortalities to the BLM and the CDFG, and shall work with the BLM and CDFG to implement additional or amended measures to reduce the mortalities. A field contact representative (FCR) shall be responsible for maintaining the records of perimeter fence inspections and repair, and shall have authority to direct the repair of damaged or destroyed fences. The FCR may be a project manager, company environmental coordinator, contract biologist, or other person identified as responsible by the Applicant.

- 4.1.5-2: Applicant shall prohibit cross-country use of vehicles and equipment except within those portions of the Project mine and process area subject to surface disturbance.

- 4.1.5-3: Applicant shall cover the pregnant and barren solution ponds with either small-mesh nets; a solid, 40-mil, HDPE/polypropylene cover; floating plastic balls; or equivalent cover acceptable to the BLM to keep wildlife out of the ponds. Applicant shall maintain the cover over the life of the Project. Applicant shall keep records of all wildlife kills which may be associated with the use of cyanide by the Project, including all dead wildlife found in or adjacent to the ponds or heap. Individual threatened and endangered species found dead on the Project mine and process area shall be sent for necropsies. Observations of wildlife killed in the ponds or on the heap shall be reported to the BLM, CDFG, and the U.S. Fish and Wildlife Service (USFWS) monthly for evaluation and, if determined necessary, for possible imposition of additional mitigation requirements.

- 4.1.5-4: Applicant shall advise Project employees, contractors, and visitors of the need to adhere to speed limits and to avoid any animals, including the desert tortoise, flat-tailed horned lizard, and deer which may be encountered on or crossing roads to and from the Project area. Applicant shall also require Project employees, contractors, and visitors to report all incidences of wildlife injury or mortality resulting from Project-related vehicle traffic on roads used to access the Project to the FCR, who shall monthly report these incidences to the BLM and the CDFG. Applicant shall participate in agency efforts to reduce mortality of wildlife on the roads used as access to the Project when so requested by the BLM.

- 4.1.5-5: Prior to completion of mining, Applicant shall conduct an assessment of the potential for a pit lake to form in the East Pit. If the assessment indicates a reasonable potential for a pit lake to form, Applicant shall backfill the East Pit to an elevation higher than the level of any pit lake which may be predicted to form from the inflow of ground water and, thereby, prevent the

creation of an attractive nuisance for wildlife. The findings of the pit lake assessment shall be completed and submitted for approval by the BLM prior to the completion of mining activities. Applicant shall monitor open pit areas monthly during the duration of post-mining reclamation for any evidence of the formation of a pit lake. The results of this monitoring shall be reported monthly to the BLM. Should the BLM determine that the monitoring indicates that a pit lake is forming or may form, the Applicant may be required to conduct an additional study or place additional backfill material into the bottom of the East Pit.

- 4.1.5-6: Before removal of the perimeter fence at the end of the active life of the Project, Applicant shall regrade haul roads within the open pit such that wildlife or humans may still use them to exit the residual open pit should they pass the barricade around the rim.

- *The following additional measures have been incorporated into the Project design to reduce the impacts on microphyll woodland habitat and associated wildlife which utilize this habitat.*

- 4.1.5-7: Applicant shall construct a fence, no less than four (4) feet in height with 3-strands of smooth wire, or equivalent, around the approximately 40-acre south-central portion of the central wash internal to the Project mine and process area which is not intended to be disturbed by Project operations to prevent accidental surface disturbance of the microphyll woodland habitat in this area during mine construction and operation.

- 4.1.5-8: Applicant shall provide periodic slug irrigation to enhance the establishment of ironwood and deer browse vegetation within the surface drainage identified by Mitigation Measure 4.1.5-7 to enhance the quality of habitat and provide established deer browse which would be immediately available at the end of the active life of the mine. Vegetation selected for enhanced deer browse establishment shall be comprised of species known to occur in the Project area. The irrigation shall be reduced and then ceased once the vegetation is established. The composition of the seed mix and the design of the vegetation enhancement measures shall be submitted to the CDFG for approval prior to implementation.

- 4.1.5-9: Applicant shall construct and maintain during the life of the Project three (3) big game guzzlers in a design and location acceptable to the BLM and the CDFG in the general vicinity of the Project mine and process area to provide for more intensive use of the existing habitat by deer and other wildlife. Within one (1) year of approval of the ROD, the Applicant shall have either: provided sufficient funds to a third party (acceptable to BLM and CDFG) which shall construct, own, and operate the guzzler; or completed construction of the guzzler. Applicant or the acceptable third party shall obtain the required permits from the BLM prior to guzzler construction. The guzzler shall remain after reclamation.

- 4.1.5-10: Applicant shall provide periodic slug irrigation to enhance the establishment of ironwood and deer browse vegetation along the western slopes and banks of the approximately 3,000-foot section of the existing ephemeral stream channel immediately adjacent to, but outside

of, the east-southeast boundary of the Project mine and process area. Vegetation selected for enhanced deer browse establishment shall be comprised of species known to occur in the Project area. Supplemental watering shall only be conducted for the first few years to allow the plants to become established. Water shall be reduced over a period of time to enable the plants to acclimate to natural moisture conditions. The composition of the seed mix and the design of the vegetation enhancement measures shall be submitted to and approved by the CDFG prior to implementation.

- 4.1.5-11: Applicant shall conduct annual transect surveys in the spring season of the ephemeral washes which flow out of the Project mine and process area, the principal washes which flow into the Project mine and process area upstream of the Project mine and process area to serve as a control, and the undisturbed ephemeral washes within the Project mine and process area, for the purpose of determining if Project construction and/or operations are having an indirect adverse effect on microphyll woodland habitat not directly impacted by surface disturbance. The surveys shall document the diversity, density, and cover of the vegetation directly associated with the washes, and shall include observations regarding the general "health" of the vegetation. The surveys shall also document any observations regarding sediment transport processes within the washes any incidental sightings of deer fawn, bighorn sheep, bobcat, kit fox, mountain lion, or other species specified by the BLM. An annual report of the results of the surveys shall be prepared and submitted to the BLM and CDFG in a form acceptable to the BLM. If, as a result of these surveys, microphyll woodland habitat downstream of the Project mine and process area is determined to be adversely impacted by the Project, appropriate additional mitigation measures may be required by the BLM and shall be implemented by the Applicant. BLM may require the Applicant to acquire title to off-site private lands with comparable microphyll woodland habitat, in a location acceptable to the BLM and the Applicant, to compensate at a 3:1 ratio for adverse impacts to microphyll woodland habitat not otherwise compensated for which cannot be mitigated through application of these additional mitigation measures.

- 4.1.5-12: Applicant shall construct all stream channel diversions to divert flows back into the same major wash system and ensure the continuing flow of an equivalent pre- and post-Project quantity of water through the major drainages to preserve the downstream microphyll woodland habitat within the drainages (see also Mitigation Measure 4.1.5-15 and mitigation measures provided for surface hydrology in Section 4.1.3.1.3).

- 4.1.5-13: Applicant shall implement the Project Reclamation Plan in conformance with the requirements of the BLM and Imperial County. The Reclamation Plan shall include a program for revegetation of the permanent diversion channels, including the planting of seedlings of young ironwood and palo verde at a density approximating that of the displaced washes and seeding of the pre-Project wash habitat (see also Mitigation Measure 4.1.5-17). The transplanted seedlings shall be protected from browsing or trampling by wire cages for the first two (2) years and from excessive sun by shade material, if necessary, or native nurse plants, if available and necessary, to facilitate transplant success.

Microphyll woodland vegetation within the permanent diversion channels shall be established during early mining operations and managed and monitored throughout the life of the Project. Applicant shall conduct annual transect surveys in the spring season of the diversion channels for the purpose of determining revegetation success. The surveys shall document the diversity, density, and cover of the vegetation directly associated with the washes, and shall include observations regarding the general "health" of the vegetation. An annual report of the transect surveys shall be prepared and submitted to the BLM, Imperial County and CDFG in a form acceptable to the BLM and Imperial County. Should the surveys indicate that the revegetation of the diversion channels may not meet the standards required by the approved Reclamation Plan, the BLM and Imperial County may require appropriate additional revegetation measures to be implemented by the Applicant.

- 4.1.5-14 Applicant shall construct and maintain as a part of final reclamation, one or more big game and/or small game guzzlers within the Project mine and process area in a design and location acceptable to the BLM and the CDFG to enhance the area as habitat for deer and other wildlife. Final Project reclamation bond(s) shall not be released until either: the Applicant has provided sufficient funds to a third party (acceptable to BLM and CDFG) which shall construct, own, and operate the guzzler(s); or the Applicant has completed construction of the guzzler(s). Applicant or the acceptable third party shall obtain the required permit from the BLM prior to guzzler construction. The guzzler(s) shall remain after reclamation. The guzzler(s) shall be designed and constructed in a manner which allows desert tortoise to readily exit the guzzler(s).

- 4.1.5-15: Project actions would require the realignment of sections of washes. Applicant shall develop a specific plan for approval of the BLM that ensures maintenance of intermittent flood water flow down these realigned wash channels into unmodified drainage boundaries outside of the Project in order to preserve vegetation and wildlife habitat. Design of these sections of realigned wash shall also include appropriate dimensions and slopes to accommodate continued use by wildlife during mining operations and to facilitate revegetation. A specific plan shall be prepared by Applicant and submitted to the ICPWD and BLM for review, and approval of the BLM, prior to the onset of any activities that would result in disturbance to these drainages. Plan design shall include the vegetation of channel diversions with native species that include ironwood and palo verde in order to maintain continuity of washes and enhance wildlife habitat, in conformance with the approved Reclamation Plan. Unless explicitly directed otherwise by the BLM (in consultation with the CDFG), all diversion channel lining materials and rip rap shall be removed from the diversion channels.

- *The following measures have been incorporated into the Project design to reduce the long-term impacts of the Project on plant and wildlife habitat and to enhance reclamation of plant and wildlife habitat.*

- 4.1.5-16: Upon completion of mining activities, Applicant shall remove all equipment and materials from the Project area. Unless explicitly directed otherwise by the BLM (in consultation

with the CDFG), all diversion channel lining materials and rip rap shall be removed from the diversion channels and any necessary reclamation completed by the Applicant, consistent with the approved Reclamation Plan.

- 4.1.5-17: The Project Reclamation Plan shall include the collection of both fairy duster seeds and winged cryptantha seeds and distribution of the collected seeds of both species within appropriate microhabitats within the Project mine and process area. During Project operations, the Applicant shall experiment with the seeds (and transplants if reseeding is not successful), of both species to assure plant success and survival. Recovery of these two (2) species shall be considered successful when species density meets or exceeds the criterion set forth in the Approved Reclamation Plan.

- 4.1.5-18: Applicant shall stockpile available soil from the wash channels to be disturbed within the Project mine and process area and store the soil for subsequent use during reclamation activities. Soil stockpiles shall be located away from washes and other areas prone to erosion and consolidated as appropriate to reduce disturbance to undisturbed areas within the Project mine and process area. Stockpiles shall be kept shallow and dry, if not to be used within one (1) year of initial placement, to protect seeds entrained in the soil.

- 4.1.5-19: Applicant shall salvage specimens of selected plant species from the Project mine and process area prior to construction to be utilized during habitat enhancement activities or other Project reclamation needs. Plant species may include cactus, ocotillo, ironwood, palo verde, or other appropriate species identified by the BLM.

- 4.1.5-20: Applicant shall implement weed control measures such that all introduced plants (e.g., salt cedar (*tamarisk species*), mustard, and other noxious weeds) will not become established within the Project area. Manual or mechanical means of control shall be the preferred methods employed. Use of other methods (e.g., herbicides) shall require approval by the BLM. The weed control measures shall be implemented within six (6) months of when noxious weeds are visually identified within the Project area and shall continue over the life of the Project. Tamarisk species shall be actively controlled throughout the life of the Project by eradication of any seedlings or growth observed. If tamarisk is determined to be a continuing problem after the completion of reclamation, a portion of the reclamation bond in an amount determined appropriate by the BLM and Imperial County shall be retained to fund an eradication program to eliminate factor(s) conducive to tamarisk growth (e.g., moist areas).

- 4.1.5-21: Applicant shall implement the revegetation program contained in the Project Reclamation Plan approved by Imperial County and the BLM. The revegetation program shall include a test plot program, surface contouring and shaping, salvage and distribution of stockpiled soils, collection of a seedbank of seeds from within and in the vicinity of the Project area, preparation of seedbeds, seeding with approved mixtures of native plant species endemic to the area, planting of the plants salvaged from the area prior to mine construction, monitoring

for invasion of noxious weeds or salt cedar, and vegetation success monitoring. The standards for revegetation success shall be specific to each vegetation type and based on reasonably achievable results that shall provide a plant cover and density sufficient to support long-term revegetation. Final bond release shall occur when the vegetation success criteria set forth in the Reclamation Plan have been met and the reestablishment of vegetation is confirmed.

- 4.1.5-22: Applicant shall integrate the revegetation program activities with other stabilization and reclamation activities required by the approved Reclamation Plan (see also Mitigation Measures 4.1.5-12 and 4.1.5-13).

- 4.1.5-23: Access roads which are created, or any other areas which are disturbed for the construction of the transmission line, pipeline, and well field, shall be reclaimed when they are not needed for ongoing maintenance. Reclamation methods shall include regrading, surface preparation, and revegetation either through seeding or natural processes.

- 4.1.5-24: To compensate for those lands not reclaimed within the East Pit, Applicant shall perform reclamation activities on one or more off-site locations on land in the vicinity of the Project acceptable to Applicant and the BLM, as appropriate, to reclaim habitat which has been adversely impacted by previous actions unrelated to the Project.

- 4.1.5-25: Applicant shall repair any detected leak in the water pipeline along Indian Pass Road as soon as reasonably possible in order to prevent tamarisk invasion and eliminate an attractive nuisance to wildlife.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.5-26: Applicant shall enter into a Stream Alteration Agreement with the California Department of Fish and Game (CDFG) as required pursuant to California Fish and Game Code Section 1603 which shall contain those measures which CDFG and Applicant agree may be necessary, or appropriate, to mitigate, and compensate for, the impacts of the Project on the stream channels and associated microphyll woodland habitat and wildlife. The October 31, 1997 draft of the Stream Alteration Agreement for the Imperial Project includes the following substantive requirements, which are subject to modification until agreed to by both parties:

  (1) "For impacts to approximately 90 acres of microphyll woodlands, the Operator shall mitigate, through the purchase of off site lands, at a 3:1 ratio. The location of the mitigation area shall be subject to review and approval of the Department. The mitigation lands shall be deeded to the Department."

  (2) "The Operator shall install and maintain for the life of the project, three (3) big game guzzlers at locations tp be approved by the Department. One additional guzzler shall be

installed within the off-site mitigation land addressed ... above. One guzzler will also be constructed within the project site prior to final reclamation."

(3) "As addressed within the DEIS/EIR ..., Operator shall; fence the approximately 40 acres contained within the central wash to prevent human intrusion, enhance the surrounding microphyll woodland habitat within the Central Wash area shall be fenced to prevent human intrusion, enhance the surrounding microphyll woodland habitat through various methods, implement and maintain a vigorous exotic and invasive weed control program, maintain all setbacks, berms, and erosion control features within the project."

(4) "In those project areas where active nesting birds occur, the Operator shall flag or stake a minimum of five (5) yards in all directions. This flagged zone shall not be disturbed until the nest becomes inactive, or unless otherwise directed by the Department."

- 4.1.5-27: Applicant shall comply with all of the terms and conditions of the Biological Opinion prepared for the Project by the U.S. Fish and Wildlife Service in response to the BLM request for formal consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended.

- 4.1.5-28: Project actions may require either an individual dredge and fill permit (404 permit) from the U.S. Army Corps of Engineers (ACOE) or one or more Nationwide Permits. Applicant shall obtain the appropriate authorization from the ACOE prior to the onset of any actions that would disturb drainages within the Project area.

- 4.1.5-29: The California Regional Water Quality Control Board, Colorado River Basin Region (CRWQCB) shall be notified by the Applicant of Project actions, and Applicant shall comply with CRWQCB requirements for obtaining Waste Discharge Requirements and Certification under Section 401 of the Clean Water Act for proposed discharges to land and a general Storm Water Permit.

<u>Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts</u>:

- *The following measures were identified to mitigate the effects of the Proposed Action on the Desert tortoise. These, or similar, mitigation measures, have been required by the Biological Opinions issued by the U.S. Fish and Wildlife Service for nearby projects, including the American Girl Mine, the Mesquite Mine, and the Mesquite Regional Landfill. Each of these measures would be required by the BLM for the Proposed Action:*

- 4.1.5-30: Applicant shall designate a field contact representative (FCR) who shall be responsible for overseeing compliance with protective stipulations for listed species. The FCR shall have authority to halt all activities that are in violation of the stipulations. The FCR shall have a copy of all appropriate stipulations when work is being conducted within the Project area. The FCR

may be a project manager, company environmental coordinator, contract biologist, or other person identified as responsible by the Applicant. Applicant shall provide the name and contact information of the FCR to the BLM and applicable responsible agencies prior to construction.

- 4.1.5-31: During the life of all Project activities, stockpiling of equipment and vehicles shall utilize only those portions of the Project area that would be subject to permanent disturbance. Temporary or inadvertent disturbance of remaining portions of the area should be minimized by: staking, "flagging," or otherwise clearly marking the boundaries of the alignment; notifying employees of the specific areas, boundaries of the areas, and the need to avoid disturbance to remaining areas; and posting signs or erecting temporary fencing at access points to limit access to authorized vehicles and equipment only.

  All employees shall be instructed that their activities shall be confined to locations within flagged or otherwise marked areas.

  The area of disturbance shall be confined to the smallest practical area, considering extent and location of ore bodies, topography, placement of facilities and access roads, locations of sensitive species, public health and safety, and other limiting factors. To the extent practical, previously disturbed areas within the Project mine and process area shall be used for the placement of equipment, work staging sites, or parking of vehicles.

- 4.1.5-32: Open pipeline trenches, test holes, or test trenches shall be regularly inspected by the FCR, or qualified biologist acceptable to the BLM, a minimum of three (3) times per day. During excavation of trenches or holes, escape ramps consisting of loose earth deposited in the test hole or trench shall be placed to facilitate the escape of any wildlife species that may enter the excavations. Any animals discovered shall either be allowed to escape before activities resume or carefully removed from the pit or trench and allowed to escape. A final inspection of the open trench segment or hole shall also be made by the FCR, or qualified biologist acceptable to the BLM, immediately prior to backfilling. Arrangements shall be made prior to the onset of maintenance or construction to ensure that listed wildlife species can be removed from the trench without violating any requirements of the federal or California Occupational Safety and Health Administration. All test holes shall be immediately capped or abandoned upon completion of drilling to prevent access of wildlife.

- 4.1.5-33: Toxic materials maintained on the Project area shall be stored and used in a manner that prevents harm to desert tortoises and other wildlife species. Methods of containment shall be approved by the BLM.

- 4.1.5-34: Nets or other suitable coverings shall be placed over all ponds containing toxic solutions to prevent contact by area wildlife species, including bats. These coverings shall be regularly inspected and maintained by Applicant for the duration of the Project. Methods of cover, inspection, and maintenance shall be approved by the BLM.

- 4.1.5-35: Project employees involved with regular activities shall be required to take a threatened and endangered species education training program which shall include a discussion of both endangered and threatened species and species that are not endangered or threatened. The program shall include information on the biology of listed, sensitive and unlisted species as well as the desert tortoise, flat-tailed horned lizard, mule deer, big horn sheep, and bats and their occurrence in the Project area. The discussion shall include information on the measures being implemented for the protection of these species and their habitats during Project activities and means by which individual employees can facilitate this process.

  A program approved by BLM shall be employed and taught by a qualified individual acceptable to the BLM. Wallet-size cards signifying completion of training shall be issued to employees. All employees shall participate in the education program prior to commencing Project activities. New employees shall receive formal approved training prior to working on-site. The program shall typically last from between one and two hours and shall cover the following topics at a minimum:

  - Distribution in general and in the Project area;
  - General behavior and ecology;
  - Sensitivity to human activities;
  - Legal protection;
  - Penalties for violation of State and federal laws;
  - Reporting requirements; and
  - Project mitigation measures.

- 4.1.5-36: Incidences of observations of desert tortoises and their sign during activities shall be conveyed to the FCR during all Project activities. Employees shall be notified that they are not authorized to handle or otherwise move any desert tortoises encountered.

- 4.1.5-37: Tortoises commonly seek shade during the hot portions of the day. During mine project activities, employees shall be required to check under equipment and vehicles prior to moving such. If tortoises are encountered, the vehicle shall not be moved until such animals have voluntarily moved to a safe distance away from the parked vehicle.

- 4.1.5-38: If desert tortoises must be moved during any Project activities, the following procedures shall be implemented by persons authorized by the USFWS to handle desert tortoises:

  (1) Desert tortoises shall be handled only by an authorized tortoise handler and only when necessary. New latex gloves shall be used when handling each desert tortoise to avoid the transfer of infectious diseases between animals. Desert tortoises shall be moved the minimum distance possible within appropriate habitat to ensure their safety. In general, desert tortoises shall not be moved in excess of 1,000 feet for adults and 300 feet for

hatchlings. An authorized tortoise handler should follow the general handling methods contained in the "Protocols for Handling Live Tortoises" (USFWS 1990).

(2) Desert tortoises that are found above ground and need to be moved shall be placed in the shade of a shrub. All desert tortoises removed from burrows shall be placed in an unoccupied burrow of approximately the same size as the one from which it was removed. All excavation of desert tortoise burrows shall be done using hand tools, either by, or under the direct supervision of, an authorized tortoise handler. If an existing burrow is unavailable, an authorized tortoise handler shall construct or direct the construction of a burrow of similar shape, size, depth, and orientation as the original burrow. Desert tortoises moved during inactive periods shall be monitored for at least two days after placement in the new burrows to ensure their safety. An authorized tortoise handler shall be allowed some judgement and discretion to ensure that survival of the desert tortoise is likely.

(3) If desert tortoises need to be moved at a time of the day when ambient temperatures could harm them (less than 40 degrees F or greater than 90 degrees F), they shall be held overnight in a clean cardboard box. These desert tortoises should be kept in the care of an authorized tortoise handler under appropriate controlled temperatures and released the following day when temperatures are favorable. All cardboard boxes shall be appropriately discarded after one use.

(4) All desert tortoises moved shall be marked for future identification. An identification number using the acrylic paint/epoxy covering technique should be placed on the fourth costal scute (USFWS 1990). No notching should be authorized.

To facilitate clearing the area of desert tortoises, excavation of burrows should begin no more than fourteen (14) days prior to the onset of surface disturbing activities, as long as a final survey is conducted within 24 hours of the onset of activities to ensure that desert tortoises have not returned to the work area.

- 4.1.5-39: In order to minimize any exposure risk to desert tortoises, a specially designed fence shall be constructed around all portions of the Project area containing pits, ponds, waste rock stockpiles, ore processing areas, maintenance areas, and surface facilities. The final fence design shall be discussed with and found acceptable to the USFWS, BLM, and CDFG. The desert tortoise exclusion fence must meet the following preliminary design specifications:

(1) Fencing shall result in a non-breachable barrier, and its support structure may be comprised of a variety of materials;

(2) Galvanized ½-inch diameter mesh and 36-inch wide hardware cloth shall be used; and

(3) The hardware cloth shall be buried 12 inches underground, extend at least 24 inches above the ground, and be firmly attached to the bottom of the perimeter fence and other wildlife exclusion fences.

- 4.1.5-40: Following fence installation, and prior to initiation of mining, authorized biologists under the supervision of an authorized tortoise handler shall conduct a complete (i.e., 100%) survey for desert tortoises within the fenced area. All tortoises found shall be marked and removed from the fenced mine area for safe off-site release within 1,000 feet of the outside of the Project fence using protocols acceptable to the BLM, USFWS, and the CDFG. Prior to release, a total of up to ten (10) of these tortoises (consisting, insofar as possible, of equal sex ratios of adult animals) shall be equipped with radio transmitters, and an equal number of individual additional tortoises (consisting, insofar as possible, of equal sex ratios of adult animals) from the "resident" tortoise population outside of the Project mine and process area shall also be equipped with radio transmitters. For a three-year period, the specific locations of all telemetered tortoise will be rechecked at monthly intervals by the FCR and mapped and recorded. Once each year, an qualified biologist will examine telemetered tortoises and record data relative to the animal's location, movements, health, and any changes noted. Data from these surveys will be used to assess the effects of relocation on both the tortoises relocated from the Project mine and process area and those resident tortoises present within the relocation area.

- 4.1.5-41: At the conclusion of Project pre-activity surveys and the relocation of any desert tortoises outside of the Project fence, Applicant and an authorized tortoise handler shall prepare a summary report documenting the desert tortoise protection measures implemented. The summary report shall be submitted to the BLM.

- 4.1.5-42: Pipeline placement design outside of tortoise-proof fenced project boundaries shall allow for the unimpeded movement of tortoises and other small terrestrial wildlife species.

- 4.1.5-43: That portion of the transmission line corridor extending outside of the fenced Project mine and process area boundary shall be re-surveyed for desert tortoise burrows and pallets within fourteen (14) days preceding line upgrading/construction. Tortoise burrows and pallets encountered within the construction zone (if any) shall be conspicuously flagged by the surveying biologist(s) and avoided during power pole placement or existing line upgrading. Contingent upon the findings of the pre-survey for the transmission line upgrade/construction, a determination shall be made by the BLM as to whether or not on-site desert tortoise monitoring would be required during the transmission line upgrade/construction activities.

- 4.1.5-44: Transmission and distribution pole design shall prevent nesting or perching by ravens, a major predator of young desert tortoises (see also Mitigation Measure 4.1.5-54).

- 4.1.5-45: As an alternative to the use of speed bumps, notification signs for the desert tortoise and speed limit signs shall be placed and maintained within the Project boundary by Applicant

to reduce chances for inadvertent vehicle-induced injury or mortality to desert tortoises and other wildlife species. Applicant, with the concurrence of Imperial County, shall also place these signs along Indian Pass Road leading to the Project mine and process area.

- 4.1.5-46: Applicant shall participate in the BLM desert tortoise program for acquiring offsetting lands in compensation for adverse modification of desert tortoise habitat. Under the BLM policy, undesignated lands such as the Project area, where tortoises or tortoise sign are located, become Class III tortoise habitat. Within Class III habitat, an offsetting ratio of 1:1 (e.g., one (1) acre of land secured and protectively managed for each acre affected) is applied. Lands shall be first considered in Imperial County and will include 87 acres of habitat within microphyll woodland.

- 4.1.5-47: For any well field changes or drilling activities subsequently proposed for the Project, Applicant shall comply with the relevant terms and conditions of the *Biological Opinion for Small Mining and Exploration Operations in the California Desert*, dated June 1, 1992, prepared with respect to desert tortoise by the USFWS, and amended as necessary to be consistent with the desert tortoise protection measures prescribed in the USFWS Biological Opinion for the Project.

- *The following measures were developed to mitigate the effects of the Proposed Action on wildlife and wildlife movements should mining be suspended or terminated prior to either partial or complete backfilling of the West Pit and Singer Pit:*

- 4.1.5-48: Should mining be terminated prior to backfilling of the West Pit above the ground water level, Applicant shall conduct an assessment of the probability of the formation of a pit lake after mining. Any evaluation of the potential for the formation of a pit lake in an open pit shall consider the quantity of surface flow runon and direct precipitation. If the assessment reasonably indicates that ground water encountered in the West Pit may enter the pit in sufficient quantity, considering evaporation, to create a pit lake, the Applicant shall place sufficient backfill into the open portion of the West Pit to raise the floor of the pit to a level higher than the level of any pit lake which the study indicates may form.

- 4.1.5-49: Any pit left open following the completion of mining shall be left in a condition which minimizes the potential for, and quantity of, water which may enter the pit through surface water runon. In addition, the bottom of any pit left open after the completion of mining shall be composed of a layer of loose rubble to minimize the potential for the formation of standing water in the bottom of the pit from either precipitation or surface water runon.

- 4.1.5-50: Before removal of the perimeter fence, Applicant shall regrade haul roads within the open pit(s) such that wildlife or humans may still use them to exit the residual open pit(s).

Other Mitigation Measures (These are measures which may further reduce the impacts of certain effects which are below the level of significance without mitigation):

4.1.5-51: A Revegetation and Monitoring Review Committee shall be formed to serve in an advisory capacity to the BLM and Imperial County. The committee shall review the annual vegetation monitoring reports filed by the Applicant for the purpose of interpreting the information contained in the reports, advising the Applicant of actions it might take to improve the success of its revegetation efforts, and advising the BLM and Imperial County as to adjustments which should be made to the revegetation success standards. The composition of the committee shall be proposed by the Applicant and approved by the BLM and Imperial County.

- 4.1.5-52: Chuckwallas shall be moved away from any threats during construction activity and if found within the Project mine and process area during mining operations (approximately 100 meters outside the perimeter fence).

- 4.1.5-53: To prevent the inadvertent electrocution of raptors, unless otherwise agreed to by the authorized officer in writing, transmission and distribution lines shall be constructed in accordance with standards outlined in the publication "Suggested Practices for Raptor Protection on Power Lines" (Raptor Research Foundation, Inc., 1996). The right-of-way holder shall assume the burden and expense of proving that pole designs not shown in this publication are "raptor safe." Such proof shall be provided by a raptor expert approved by the authorized officer. The BLM reserves the right to require modifications or additions to all power line structures placed on these rights-of-way should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the United States.

- 4.1.5-54: Trash and food items shall be contained in closed containers to reduce attractiveness to opportunistic predators such as ravens, coyotes, and kit foxes.

- 4.1.5-55: Recreational firearms and pet dogs shall be prohibited from the Project mine and process area.

- 4.1.5-56: Applicant shall contact local animal control agents to remove feral dogs that are observed within the Project area.

4.1.5.5. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would result in the unavoidable loss of approximately 87 acres of tree/shrub vegetation habitat (desert wash microphyll woodland habitat) and approximately 1,215 acres of shrub/scrub vegetation habitat (desert succulent scrub habitat) within the Project mine and process area over the life of the Project. A total of 1,137 acres of this area would be subject to reclamation measures at the end of the Project life to reestablish the vegetation and wildlife habitat, including

33 acres in the bottom of the open East Pit. Approximately 165 acres on the slopes of the East Pit would not be reclaimed, but the Applicant has agreed to reclaim an equal number of acres disturbed by others located outside of the Project area. Approximately 198 acres, comprising the remnant East Pit, would be barricaded to discourage pit access by terrestrial species. Approximately one-half (½) of the disturbed microphyll woodland habitat would be lost and not reclaimed at the completion of reclamation. An additional 36 acres of shrub/scrub vegetation (desert succulent scrub habitat) and approximately 2 acres of tree/shrub vegetation (desert wash microphyll woodland habitat) would be lost within the Project ancillary area; and approximately 21 acres of shrub/scrub vegetation (desert succulent scrub habitat) and 1 acre of tree/shrub vegetation (desert wash microphyll woodland habitat) would be lost within the overbuilt 92 kV/34.5 kV transmission line corridor, although all of this would be subject to reclamation. Resident and non-resident wildlife species dependent on this habitat would be subject to displacement and increased mortality.

The Proposed Action would result in the unavoidable "incidental take" of an estimated 33 to 57 desert tortoises (a federal- and state-listed threatened species) currently occupying the Project area, principally through harassment and some through direct mortality. Mitigation measures are proposed in this EIS/EIR in addition to those of the Proposed Action which would reduce the effects to below the level of significance.

If mining is suspended or terminated prior to backfilling of the West Pit, the West Pit would remain as an open excavation and could produce adverse effects on wildlife. Mitigation measures are proposed in this EIS/EIR which would reduce these effects to below the level of significance.

The mitigated effects of the Proposed Action on biological resources are below the levels of significance.

4.1.6. Cultural and Paleontological Resources

This section is based on the cultural resource report prepared for the area of the Proposed Action by KEA Environmental, Inc. (Pigniolo et al. 1997), which summarizes the results of the ethnohistoric research conducted by Tierra Environmental Services (Baksh 1997). The non-confidential portions of the KEA report are provided as Appendix L of this EIS/EIR. The Tierra report is included as an appendix to the KEA report.

4.1.6.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Disrupt or adversely affect a historic property, including a property with traditional cultural significance (as determined by the NRHP and implementing regulations); or

- Disrupt or adversely affect a significant paleontological site except as part of a scientific study.

Implementation of the Proposed Action would require local and state agencies to demonstrate compliance with CEQA, for which specific guidance regarding cultural resources is presented in Appendix K of the CEQA Guidelines. Federal agencies must demonstrate compliance with the National Historic Preservation Act (Public Law 89-665); 80 Stat 915; 16 USC 470; as amended) [NHPA], which requires actions similar to CEQA for the protection of significant cultural resources. Local agencies may use the NHPA process to demonstrate compliance with CEQA.

Section 106 of NHPA requires a federal agency with jurisdiction over a project to evaluate the effect of the proposed project on properties included on, or eligible for, the National Register of Historic Places (NRHP). Federal agencies must also provide the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the effects of the proposed project to these properties. The 1992 amendments to the law particularly strengthened Indian Tribe involvement in the process. Specific guidance for these actions are found in federal regulations at 36 CFR Part 800, and in the programmatic agreement between BLM, ACHP, and the California State Historic Preservation Officer (SHPO).

The basic steps in the Section 106 process are:

Step 1 - Identification and Evaluation of Historic Properties (Cultural Resources). Properties within a project's area of potential effect (APE) are identified and, in consultation with the SHPO, evaluated through application of NRHP criteria for eligibility for listing (found at 36 CFR Part 60.4), in conformance with the Secretary of the Interior's Standards and Guidelines for Evaluation (48 Federal Register 44723-44726). The full content of the eligibility criteria are provided as follows:

"The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association and:

"A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

"B. That are associated with the lives of persons significant in our past; or

"C. That embody the distinctive characteristics or a type, period, method of construction, or that represent the work of a master, or that possess high artistic values, or that represent

a significant and distinguishable entity whose components may lack individual distinction; or

"D. That have yielded, or may likely yield, information important in prehistory or history."

Step 2 - Assessment of Effects. The project's effects on cultural resources listed or determined eligible for listing on the NRHP are assessed through application of the Criteria of Effect found at 36 CFR Part 800.9(a).

- If no effect is found, the federal agency consults with the SHPO and provides documentation in support of the No Effect Determination. If no objection occurs during a 15-day review and comment period, the project can proceed.

- If an effect is found, the Criteria of Adverse Effect found at 36 CFR Part 800.9(b) are applied. The results could include: no adverse effect where, while an effect could occur, it would not be harmful to those characteristics that qualify the cultural resource for NRHP listing; or adverse effect where an effect could occur that would diminish the integrity of those characteristics that qualify the cultural resource for NRHP listing.

In the case of the Proposed Action, an Adverse Effect finding is probable. The Area of Potential Effect (APE) contains cultural resources of high religious and heritage significance that cannot be avoided.

Step 3 - Consultation. BLM and the SHPO consult and notify the ACHP, whose participation is optional. The purpose of the consultation is to develop a Memorandum of Agreement (MOA) or to determine that no MOA is needed. Interested parties, including Indian Tribes (as appropriate), are invited to participate in the consultation.

Step 4 - ACHP Comment. The ACHP reviews the MOA and, following the incorporation of proposed changes, accepts and signs it. In the absence of an MOA, the ACHP issues written comments, which BLM considers and then notifies the ACHP of its decision.

4.1.6.2. Impacts of the Proposed Action

In addition to other changes, this section has been substantially modified from the November 1996 Draft EIR in response to comments to: assess the impacts to cultural resources and features identified during the intensive cultural resource resurvey of all areas of potential surface disturbance with the involvement of the Quechan Tribe; and undertake meaningful consultation with the Quechan Tribe and other Native American tribes.

Since no paleontological resources have been found within the Project area, and none are believed present, implementation of the Proposed Action would not have an effect on any paleontological resources, and would produce no significant impacts.

As stated in Section 3.6.2.3, an intensive Class III pedestrian survey and cultural resources inventory of the Project area, the overbuilt 92 kV/34.5 kV transmission line corridor, and additional buffer areas, has been completed. The field investigators evaluated 55 archaeological sites and the Indian Pass-Running Man ATCC as eligible for the NRHP (see Appendix L). The Indian Pass-Running Man ATCC and large multi-component sites in the Project mine and process area are evaluated as eligible under Criteria "A," "C" and "D" (see 36 CFR 60.4). Prehistoric geoglyphs along the overbuilt 92 kV/34.5 kV transmission line corridor are evaluated as eligible under Criteria "C" and "D." Most prehistoric trails are evaluated as eligible under Criterion "D" only, but named trails, those associated with a concentration of cultural features, and those that are particularly well preserved are evaluated as eligible under Criteria "C" and "D". Camp Pilot Knob is evaluated as eligible under Criteria "A" and "D." Ceramic scatters and several other prehistoric sites along the transmission line are eligible under Criterion "D."

Impacts to the cultural resources ultimately determined eligible for the NRHP under criterion "D" would be considered significant unless a treatment program to recover the scientific information and other NRHP-qualifying values of each resource is successfully implemented before the Proposed Action proceeds with the activities which would impact that resource. If cultural resources determined to be significant under Criterion "A," "B" or "C" are adversely affected by the Proposed Action, a determination of adverse effect would need to be made by the BLM, and the resulting impacts would be significant.

Much of the Project mine and process area is expected to undergo direct impacts from excavation of the open pits and construction and operation of the leach pad, waste rock stockpiles, soil stockpiles, diversion channels, haul and access roads, and associated processing and support facilities. The remaining undisturbed acres within the Project mine and process area are principally the throughgoing ephemeral stream channels and isolated areas located between areas of disturbance. Given the intensive nature of the Proposed Action, essentially all of the cultural resources within the Project mine and process area are expected to experience either direct or indirect impacts without special mitigation. Glamis Imperial has adjusted the layout of several Project facilities within the Project mine and process area since November 1996 to avoid direct impacts to certain culturally significant features within the large multi-component sites. The Project mine and process area boundary has been moved and the size of the Project mine and process area reduced to avoid a trail and geoglyph system. One (1) waste rock stockpile and two (2) soil stockpiles have been eliminated, and the configuration of the remaining waste rock stockpiles, soil stockpiles, haul roads, and the heap leach pad have been adjusted to avoid several trails, geoglyphs, and other culturally significant features. However, it is not economically feasible to avoid all of the features that contribute to the significance of these cultural resource sites, and the direct and indirect impacts to these eligible cultural resources within the Project mine and process area would be significant.

Because the entire Project mine and process area is completely fenced, no direct impacts are expected from operations conducted within the Project mine and process area to identified cultural resource sites located outside of the fence. However, indirect impacts to identified cultural resources located adjacent to, but outside of, the Project mine and process area may occur if more intense recreational use occurs in these areas as a result of these uses being excluded from the Project mine and process area. These indirect impacts to eligible cultural resources would be significant.

Project facilities constructed or operated within the Project ancillary area are either narrow, linear features (such as the transmission line, water pipeline, and Indian Pass Road realignments), or features of relatively small surface area (such as the water well pad areas and well pump generator area). Because there is generally more flexibility regarding the actual siting of each of these Project components, avoidance of NRHP-eligible cultural resources within the Project ancillary area is possible, although not completely certain. Indirect impacts to identified cultural resources located adjacent to the Project ancillary area may also occur, either as the result of increased use of these areas by Project workers and service personnel, or if more intense recreational use occurs in these areas. These potential direct and indirect impacts to eligible cultural resources would be significant.

Surface disturbance associated with the construction of the overbuilt 92 kV/34.5 kV transmission line is estimated at a maximum of 22 acres. This consists of redisturbance of many of those areas disturbed during original construction of the 34.5 kV transmission line in the mid-1960's (pole access trails, construction areas, cable pulling stations, etc.) and some new disturbance associated with the pole access trails, pole construction areas, cable pulling stations, and construction staging areas. Because there is substantial flexibility regarding the location of those overbuilt 92 kV/34.5 kV transmission line facilities which produce the new surface disturbance, and because most of the significant cultural features are located in portions of the cultural sites outside of the actual overbuilt 92 kV/34.5 kV transmission line corridor, it is possible, but not certain, that all of the identified NRHP-eligible cultural resources within the overbuilt 92 kV/34.5 kV transmission line corridor would be avoided. However, the direct and indirect impacts of the construction of the overbuilt 92 kV/34.5 kV transmission line on eligible cultural resources would be significant prior to mitigation.

Because of the large size of Camp Pilot Knob (CA-IMP-[TL-35]), complete avoidance of this cultural resource site by construction of the overbuilt 92 kV/34.5 kV transmission line would not be possible. However, relatively little ground disturbance to this property would occur because most of the pole locations are immediately adjacent to the existing Sidewinder Road. Therefore, the field investigators have concluded that the values that make the property eligible for the NRHP would not be adversely affected by the construction (see Appendix L), and thus this would not result in a significant impact. Indirect adverse affects to significant historic cultural resources associated with Camp Pilot Knob located adjacent to the overbuilt 92 kV/34.5 kV transmission line corridor may occur if these properties are incidentally disturbed by transmission line construction workers. This potential indirect impact to this eligible historic cultural property would be significant.

The Indian Pass-Running Man ATCC, including the affected section of the Trail of Dreams, is evaluated as eligible under Criteria "A," "C" and "D." The Project mine and process area cannot avoid impacts to the Indian Pass-Running Man ATCC. According to knowledgeable Quechan representatives, development of the Project would destroy their ability to use the Indian Pass-Running Man ATCC for religious and educational purposes, which would have a "devastating" impact on their cultural heritage. Between fifteen (15) and twenty (20) percent of the Indian Pass-Running Man ATCC would be physically disturbed by the Project mine and process area. The Quechan have stated that construction of the Project would permanently cut-off their ability to use the Trail of Dreams to travel physically and spiritually to the sacred Newberry Mountain. Additionally, because views into and from the Indian Pass-Running Man ATCC contribute to the significance of the Indian Pass-Running Man ATCC, the construction of the waste rock stockpiles and heap would cause a permanent, out-of-character visual intrusion that would severely disrupt cultural use of the Indian Pass-Running Man ATCC. Similarly, solitude is an important contributing characteristic of the Indian Pass-Running Man ATCC, and operation of the Project would cause substantial aural impacts to the Indian Pass-Running Man ATCC. Aural impacts would be long-term, but not permanent, as they would cease upon completion of mining and reclamation. Some of the Project ancillary facilities are also located within the Indian Pass-Running Man ATCC, and would adversely affect the character of the Indian Pass-Running Man ATCC, although to a relatively minor degree when compared to the impact of the Project mine and process area on the Indian Pass-Running Man ATCC. These impacts to the Indian Pass-Running Man ATCC are considered significant.

4.1.6.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.6-1: To reduce Project impacts on identified cultural resources, Project facilities associated with the Project mine and process area shall be located consistent with those presented in the Plan of Operations (Revised September 1997). This shall include all of the Project revisions included since the previous Plan of Operation (Revised October 1996), including the revised boundary of the Project mine and process area, the reduction in the height of the waste rock stockpiles, the elimination of one (1) waste rock stockpile and two (2) soil stockpiles, and the reconfiguration of the remaining waste rock stockpiles, soil stockpiles, haul roads, and the heap leach pad.

<u>Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts</u>:

No specific measures.

<u>Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.6-2: Applicant shall designate a project contact representative (PCR) who would be responsible for overseeing Project compliance with the conditions and stipulations for cultural resources. The PCR shall have authority to halt all activities that are in violation of the stipulations. The PCR may be a project manager, company environmental coordinator, or other person identified as responsible by the Applicant. Applicant shall provide the name and contact information of the PCR to the BLM prior to construction.

- 4.1.6-3: Should previously unidentified cultural resources be discovered during project construction or operations, Applicant shall immediately cease all activities in the immediate vicinity of the discovery and notify the BLM. Activities shall not be reinitiated in the vicinity of the discovery until authorized by the BLM.

The following mitigation measures were identified by KEA Environmental, Inc. (Pigniolo et al. 1997) as a result of the inventory and evaluation of cultural resources that may be affected by the Proposed Action. These mitigation measures have not been incorporated in the Project by the Applicant, but may be incorporated, in whole or in part, into BLM's Record of Decision for the Proposed Action following completion of on-going consultation with the SHPO and ACHP pursuant to Section 106 of the National Historic Preservation Act, and on-going Government-to-Government consultation with the Quechan Tribe as required by President Clinton's directive of April 29, 1994:

- *The following measures are proposed to mitigate the physical disturbance within the Project mine and process area which will occur to the features of religious-symbolic significance within the Indian Pass-Running Man ATCC:*

- 4.1.6-4: Extant cultural features in the Indian Pass-Running Man ATCC should be avoided to the extent possible. KEA's GPS data base should be provided to Glamis Imperial to determine whether additional features can be avoided.

- 4.1.6-5: A professional archaeologist should flag or fence avoided features near construction areas prior to initial site preparation. Environmental inspectors should monitor avoidance. Flags outside of the perimeter fence should be removed immediately after construction of that fence.

- 4.1.6-6: An archaeological data recovery program conforming to that recommended in Chapter 9 of the KEA report should be implemented and should include a description and analysis of the features and artifacts that would be destroyed by the project and a technical archaeological report.

- *The following measures are proposed to mitigate the physical disturbance within the Project mine and process area which will occur to significant Native American trails and will cut-off the ability of the Quechan to travel physically and spiritually along the Trail of Dreams:*

  - 4.1.6-7: In consultation with the Quechan, extant trails in the Indian Pass-Running Man ATCC should be field mapped and their significance to Native Americans ascertained. Low-level aerial photography and video photography should be used to document trails that will be destroyed. It appears from present information that certain trail corridors through the Indian Pass-Running Man ATCC west of the mine and process area can be preserved, including routes to *Avikwaame.* Preserved segments with high Native American sensitivity should be nominated to the NRHP and a preservation plan prepared and adopted by the BLM.

- *The following measures are proposed to mitigate the physical disturbance and visual and aural intrusions in and from the Project mine and process area into the Indian Pass-Running Man ATCC which will conflict with the Quechan traditional practices and inhibit the Quechan's ability to conduct traditional religious activities at the Indian Pass-Running Man ATCC:*

  - 4.1.6-8: In accordance with the current Plan of Operations, the height of the waste rock stockpiles and heap should be restricted to 300 feet.

  - 4.1.6-9: The BLM should continue consultation with the Quechan to ensure continued access to the Indian Pass-Running Man ATCC during Project implementation and after Project closure.

- *The following measures are proposed to mitigate the disturbance created within the Project mine and process area which will inhibit or destroy the Quechan's ability to use the Indian Pass-Running Man ATCC for traditional cultural education programs:*

  - 4.1.6-10: Provide for a cultural educational program which would include a professional-quality video documentary of the Indian Pass-Running Man ATCC prior to disturbance; a full or part-time teaching/curatorial position for a Quechan tribal member for a period of three (3) to five (5) years; preconstruction cultural educational classes in the Indian Pass-Running Man ATCC; and a comprehensive report documenting Quechan history and prehistory written in part or in its entirety by the Quechan.

  - 4.1.6-11: Delay or phase construction activities to allow the Quechan the opportunity to conduct traditional cultural education in the Indian Pass-Running Man ATCC prior to their loss of this resource.

  - 4.1.6-12: A non-technical report should be written based on the archaeological and ethnographic studies written for the Quechan tribe, addressing the part of Quechan history that would be destroyed by the mine.

- 4.1.6-13: Provide for the expansion plan for the Quechan Museum and curation of artifacts from the Project in this facility.

- *The following measures are proposed to mitigate the cumulative adverse effects that the disturbance created by the Project mine and process area will have on traditional cultural sites in Quechan territory:*

- 4.1.6-14: The Indian Pass-Running Man ATCC, the Trail of Dreams, Pilot Knob, Muggins Peak, and the Picacho Basin should be nominated to the NRHP as traditional cultural properties.

- 4.1.6-15: A recording and protection program for the concentration of scratched petroglyphs at Indian Pass should be implemented.

- 4.1.6-16: Consultation should be initiated with the Quechan to identify a site of traditional concern that could be acquired and protected.

- *In addition to the measures listed above to mitigate the adverse effects on the Indian Pass-Running Man ATCC, the following measures are proposed to mitigate the physical disturbance created by the Project mine and process area to all or parts of seven (7) multicomponent and twelve (12) trail sites, which will result in data loss and the destruction of historic context:*

- 4.1.6-17: An archaeological data recovery program (in accordance with the recommendations provided in Chapter 9 of KEA's cultural resource report) should be implemented at sites that cannot be avoided.

- *The measures listed above to mitigate the adverse effects on the Indian Pass-Running Man ATCC within the Project mine and process area will also mitigate the physical disturbance and out-of-character visual and aural intrusions to the Indian Pass-Running Man ATCC created by the construction of facilities within the Project ancillary area. In addition, the following measures are proposed to mitigate the physical disturbance to significant archaeological sites created by construction within the Project ancillary area.*

- 4.1.6-18: No ground disturbance should be allowed within features that contribute to the significance of the Indian Pass-Running Man ATCC. In site CA-IMP-2727, the water pipeline should be rerouted to the area already disturbed by Indian Pass Road. Alternatively, boring could be utilized to avoid impacts to contributing features. All NRHP-eligible archaeological sites outside of the Indian Pass-Running Man ATCC should be avoided. Flagging and monitoring should be done in accordance with mitigation measure 4.1.6-5.

- *The following measures are proposed to mitigate the disturbance which could occur to features that contribute to the NRHP-eligibility of Camp Pilot Knob.*

- 4.1.6-19: Prior to construction, a professional historical archaeologist should flag all features in the vicinity of existing poles that contribute to the NRHP eligibility of Camp Pilot Knob. Periodic archaeological monitoring should be conducted to ensure avoidance. In case of accidental damage, BLM should consult with SHPO regarding an appropriate mitigation program. Oral history and archival research should be considered along with archaeological data recovery in case of such an eventuality.

- 4.1.6-20: If adverse effects cannot be avoided, an interpretive display should be developed to supplement the *E Clampus Vitus* sign that already exists on-site. This display should address the relationship of Camp Pilot Knob to the overall Desert Training Center operations and include historical photos of the camp during its period of significance.

- *The following measure is proposed to mitigate the disturbance which could occur to significant archaeological sites during the construction of the overbuilt 92 kV/34.5 kV transmission lines.*

- 4.1.6-21: All NRHP-eligible sites should be flagged for avoidance of direct impacts prior to construction of the transmission line. Avoidance of flagged archaeological sites should be part of the overall environmental monitoring program for the Project. In addition, periodic monitoring by a professional archaeologist and Quechan representative should be conducted to ensure avoidance. In case of accidental damage, BLM should consult with SHPO regarding an appropriate mitigation program. Oral history archival research, and ethnographic research should be considered as appropriate along with archaeological data recovery in case of such an eventuality.

4.1.6.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Indian Pass-Running Man ATCC, including the Trail of Dreams; seven (7) multi-component archaeological sites; and twelve (12) prehistoric trail sites in the Project mine and process area, each of which have been evaluated as eligible for the NRHP under Criteria "A," "C" and/or "D, " would not be avoided under the Proposed Action. If SHPO and the ACHP concur in the NRHP evaluation, adverse affects to each of these cultural resources would occur, and the impact of the Proposed Action would be considered significant and unavoidable, even after implementation of the mitigation measures specified in this EIS/EIR.

4.1.7. Visual Resources

4.1.7.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Have a substantial, demonstrable negative aesthetic effect.

- Substantially interfere with activities intolerant of bright lighting.

4.1.7.2. Impacts of the Proposed Action

In addition to other changes, this section has been substantially modified from the November 1996 Draft EIR in response to comments to: better analyze the visual impacts of the Proposed Action, including an additional KOP, and analyze the Proposed Action in light of the revised regrading/reclamation procedures.

Impacts to visual resources from the Proposed Action would result from: lighting of mine and process areas so that mining can occur during nighttime hours; visibility reduction resulting from the emission of particulate matter; and visual contrasts created by changes in line and form from the creation of new structures and facilities (such as the transmission line), altered surface colors, textures and vegetation cover (through surface disturbance) and changes in topography (waste rock stockpile, heap, and open pit landforms).

Lighting:

Project lighting used during nighttime operations at the administrative offices, shop area, lime silo, heap leach processing facility; portable light plants used at the active pits, waste rock stockpiles and heap leach; and head lights from mobile vehicles would produce "sky glow" and/or direct light which would be visible to some viewers, such as campers, hikers, and other nighttime dispersed recreation users in the vicinity of the Project mine and process area, including the adjacent wilderness areas, but should not be visible to developed recreation areas, such as Glamis or Gold Rock Ranch, because of distance and blocked line-of-sight. The Proposed Action includes restricting exterior night lighting to the minimum necessary, consistent with safety requirements and 24-hour-per-day operations. These effects of night lighting would not be significant.

The USMC has established a flight corridor (VFR-299) which occupies air space directly above the Project area. The Project area is currently used by the USMC for military overflights and for nighttime military operations using Night Vision Devices (NVDs). These devices can detect light at levels much lower than those that are detectable by the unaided human eye and, as such, Project lighting could pose a significant hazard to pilots during use of the NVDs, especially if the lighting is directed upward or is unexpected. Although the Proposed Action represents only a small portion of the available flight corridor, there would also be a small potential for significant interference with overflight operations from Project lighting during nighttime.

Visibility Reduction

The Proposed Action is a source of particulate matter (principally fugitive dust generated by travel on unpaved roads, blasting of rock in the pit(s), loading and unloading of ore and waste rock, combustion of diesel fuels in large engines, and wind erosion of exposed surfaces) and oxides of nitrogen (almost exclusively from the combustion of diesel fuels in large engines), both of which can contribute to the reduction in overall visibility (visual distance) in certain circumstances. In addition, particulate matter emitted in some circumstances can result in a visible "plume." No quantitative assessment of possible visibility (visual distance) reductions from the Proposed Action have been undertaken. However, computer modeling of the ambient concentrations of particulate matter and nitrogen oxides (see Section 4.1.4.2) indicate that the Proposed Action would comply with the applicable ambient air quality standards, and that ambient concentrations of these pollutants would be very low only short distances from the Project mine and process boundary. Experience at other mines in the region indicates that although there would be some circumstances where "plumes" (from blasting, or from diesel engine exhaust in certain circumstances) may be locally visible for short periods of time, substantial visibility reduction is not occurring as a result of project activities. The Proposed Action contains measures (such as dust control on unpaved roads) which substantially reduce the emissions of particulate matter and the resulting potential for visibility reduction. These impacts are judged to be below the threshold of significance.

Visual Contrast

The heap, waste rock stockpiles, and open pits constructed as part of the Proposed Action would represent a substantial visual contrast for viewers of the Project during the life of Project activities. The South Waste Rock Stockpile and the heap would both be constructed to a maximum height of 300 feet above existing grade, and would, therefore, be approximately 100 to 150 feet higher than any existing landform immediately adjacent to the Project mine and process area. The East Pit would remain open under the Proposed Action. The new transmission line and water wells in the Project ancillary area would also present a visual contrast, although to a much smaller degree. Following the completion of construction, the overbuilt 92 kV/34.5 kV transmission line would present little contrast over the existing 34.5 kV transmission line.

Implementation of the Reclamation Plan would reduce some of the impacts associated with the surface disturbance and new landforms associated with the Proposed Action over the long term. Following completion of Project operations, all structures constructed within the Project area as part of the Proposed Action (buildings, water wells, haul and maintenance roads, 92 kV/13.2 kV transmission line and substation, etc.) would be removed and the disturbed areas recontoured as necessary and seeded. The waste rock stockpiles and the heap would be recontoured, seeded, and would ultimately resemble smooth, rounded mounds. This would minimize the contrast of color and lines that would result from the Proposed Action post-mining but pre-final reclamation. However, the open pit, waste rock stockpiles and heap would remain as a permanent, substantial change to the line and form of the area.

The West Pit and Singer Pit would each be entirely backfilled under the Proposed Action. Some subsequent backfill may be necessary to raise the floor of the East Pit to a level higher than the level of any pit lake which may be eventually predicted to form from the inflow of ground water. All disturbed areas except the pit slopes would be regraded and revegetated, when no longer required for mine operations. This reclamation would create undulating land forms that are stable, do not allow for any pooling or ponding of water, and blend in with the surrounding undisturbed topography. Sharp edges would be rounded and straight lines altered to provide contours which are visually and functionally compatible with the surrounding terrain. The regrading would entail the construction of small "catchment" basins to collect precipitation and, thus, facilitate the revegetation of the disturbed areas. Other areas disturbed by facilities and roads, and the areas adjacent to diversions, would be fine graded to enhance moisture retention for reclamation and revegetation.

Revegetation activities in the disturbed areas immediately adjacent to the diversion channels and washes would include redistribution of soil, direct transplantation of trees and shrubs, seeding, monitoring and reporting. In all other areas, revegetation would include salvaging and stockpiling available soil, contouring and shaping accessible disturbed areas, reapplying soil materials as necessary, preparing seedbeds, seeding and transplanting, optimizing seed mixtures and rates, and monitoring and reporting.

Rough grading would be utilized to blend the top edges and crests of waste rock stockpiles and the heap and to construct the permanent diversion channels. Final grading would be utilized to construct small catchment basins for the collection and concentration of precipitation for revegetation of the waste rock stockpiles and leach pads. The waste rock stockpiles would have surfaces of mixed rock substrates and coarse alluvium with little developed soil or highly weathered material. The top surfaces of waste rock stockpiles would be rounded and contoured to form undulating land forms to blend with the surrounding terrain. Side slopes of waste rock stockpiles would be rough graded and small catchment basins installed. The configured surfaces and catchment basins would then be sown with seed or spread with stockpiled soil. During final reclamation, the small catchment basins (in which the plants can become established) would be constructed at varying intervals. In addition, scattered vegetation would naturally become established within a short time depending on local climatic conditions (rainfall events), softening the visual contrast with surrounding areas.

Although the Project facilities would be clearly visible from Indian Pass Road and other routes of travel in the immediate vicinity of the Project mine and process area, Project facilities in the Project mine and process area would not be easily viewable to most passersby from common viewing points in the surrounding, more distant, areas. There would be a limited view of the Project area from KOP #1, located on Ogilby Road (see Figure 4.2), the major access road in the vicinity of the Project area. The Project area would also be visible from KOP #2, located at the southern end of the top of Black Mountain (see Figure 4.4); from KOP #3, located on the top of a hill within the Picacho Peak Wilderness Area (see Figure 4.6); from KOP #4, an informal overnight camping area located along Indian Pass Road (see Figure 4.8). The Project area would also be visible from other elevated areas

in the adjacent mountains, although the potential number of viewers from any of these locations would be very limited in number.

In accordance with BLM Visual Manual Section 8400, analyses of the visual effects of the Proposed Action following completion of Project mining and reclamation activities have been conducted. Photosimulations were prepared to simulate the post-mining, post-reclamation view from each of the same four (4) KOPs. These photosimulations were prepared on digitized versions of the views shown in Figure 4.2, Figure 4.4, Figure 4.6, and Figure 4.8. To ensure proper location and scaling of the landforms which make up the Proposed Action within the Project mine and process area, USGS digital elevation maps (DEMs) were combined into a single base map on which was electronically placed the Project mine and process area boundary and the final contours for each of the major Project landforms (waste rock stockpiles, heap, and open pit) (see Figure 2.4). This information was used to create computer-generated, three-dimensional views of the topography of the Project mine and process area following the completion of final reclamation from each of the four (4) KOPs. The computer-generated images were scaled and printed to match each of the views shown in Figure 4.2, Figure 4.4, Figure 4.6, and Figure 4.8, then used to check final form and placement of the simulated views so that they were created as accurately as possible. Using images of similar reclaimed areas in similar rock types from the Picacho Mine and the Mesquite Mine to match colors and textures, photosimulations were created for each KOP.

Figure 4.3 shows the view of the Project features after the completion of reclamation from KOP #1, on Ogilby Road. From this viewpoint, only the uppermost portions of the southern end of the South Waste Rock Stockpile and the heap would be visible, at a distance of approximately four (4) miles, over the slightly elevated terrain in the immediate foreground. These Project landforms would be viewed against the darker forms of Black Mountain and the Chocolate Mountains on the horizon.

The photosimulated view of the Project area after the completion of reclamation from KOP #2, the top of Black Mountain, and from KOP #3, the top of the hill immediately south of Indian Pass in the Picacho Peak Wilderness Area, are presented in Figure 4.5 and Figure 4.7, respectively. The view from these viewpoints looks down on the Project mine and process area from distances of five (5) miles and two (2) miles, respectively. From KOP #2, there is an unobstructed view of the waste rock stockpiles and the top of the heap. From KOP #3, all of the principal Project facilities are completely visible except the East Pit, which is partially hidden by the East Waste Rock Stockpile.

The photosimulation of the view toward the Project mine and process area after the completion of reclamation from KOP #4, the informal overnight camping area adjacent to Indian Pass Road, is presented in Figure 4.9. From this viewpoint, only the uppermost portions of the southern end of the South Waste Rock Stockpile and the heap would be visible, at a distance of approximately two (2) miles, over the slightly elevated terrain in the immediate foreground. These Project landforms would be viewed against the sky, with the darker forms of Black Mountain and Picacho Peak flanking the view.

To simulate views of the Project area following the completion of mining but prior to the completion of reclamation, additional photosimulations were constructed from each of these same four (4) KOPs. Post-mining, pre-final reclamation photosimulations of the view of the Project area are presented in Figure 4.10 from KOP #1, from KOP #2 in Figure 4.11, from KOP #3 in Figure 4.12, and from KOP #4 in Figure 4.13. Each of these views differ from the post-final reclamation views principally by the "stepped" slopes and flat tops of the waste rock stockpiles and the heap, and the reduced level of revegetation. Consistent with BLM Visual Manual Section 8400, since these photosimulations show the visual effects at an interim stage and not following the completion of the Proposed Action, they have not be used in the analysis of the long-term impacts of the Proposed Action.

The level of impact to visual resources would depend upon the number of viewers of the project, the viewers' observation point, and the duration of the disturbance from the Proposed Action. Visual effects of the Proposed Action were analyzed using the standard procedures presented in Section 8400 of the BLM Manual. The potential number of daily viewers from KOP #1 (Ogilby Road) may number up to 1,000 (see 3.15). The potential number of viewers from KOP #2 would be small, averaging only a few per day, while the number of viewers from KOP #3 is likely to be very small, less than a few per month. The potential number of viewers from KOP #4 would vary depending on the season; during the winter months the number may reach several hundred per month, whereas in the summer months the number may be only a few per week.

The line of the reclaimed Project features within the Project mine and process area would approach undulating, but would remain somewhat discontinuous and have some areas with an angular line. The color of the reclaimed Project features would approach tan to brown, and would generally be lighter than much of the surrounding surface rock, which is coated with a desert varnish. The form would be rounded and rhomboid in the near ground and conical in the middle ground. The texture would approach a middle patchy. The Proposed Action would result in the permanent placement of certain line and form features in an area of the landscape that did not otherwise have those line and form features, and the overall color, line, form, and texture of the post-reclamation Project mine and process area features would not be reasonably consistent with the surrounding area. Accordingly, the post-reclamation visual impacts of the Proposed Action are determined to be above the level of significance.

Figure 4-2: Current View of the Project Mine and Process Area from Ogilby Road (KOP#1)

Figure 4-3: Proposed Action - Projected View of the Project Mine and Process Area After Final Reclamation from Ogilby Road (KOP#1)

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Figure 4-4: Current View of the Project Mine and Process Area from Black Mountain (KOP#2)

Figure 4-5: Proposed Action - Projected View of the Project Mine and Process Area After Final Reclamation from Black Mountain (KOP#2)

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Figure 4-6: Current View of the Project Mine and Process Area from a Hilltop Near Indian Pass in Picacho Peak Wilderness (KOP#3)

Figure 4-7: Proposed Action - Projected View of the Project Mine and Process Area After Final Reclamation from a Hilltop Near Indian Pass in Picacho Peak Wilderness (KOP#3)

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Figure 4-8: Current View of the Project Mine and Process Area from an Informal Overnight Camping Area on Indian Pass Road (KOP#4)

Figure 4-9: Proposed Action - Projected View of the Project Mine and Process Area After Final Reclamation from an Informal Overnight Camping Area on Indian Pass Road (KOP#4)

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Figure 4-10: Proposed Action (Post-Mining/Pre-Final Reclamation) - Projected View of the Project Mine and Process Area from Ogilby Road (KOP#1)

Figure 4-11: Proposed Action (Post-Mining/Pre-Final Reclamation) - Projected View of the Project Mine and Process Area from Black Mountain (KOP#2)

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Figure 4-12: Proposed Action (Post-Mining/Pre-Final Reclamation) - Projected View of the Project Mine and Process Area from a Hilltop Near Indian Pass in Picacho Peak Wilderness (KOP#3)

Figure 4-13: Proposed Action (Post-Mining/Pre-Final Reclamation) - Projected View of the Project Mine and Process Area from an Informal Overnight Camping Area on Indian Pass Road (KOP#4)

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Conformance with Class II Visual Objectives

Landforms constructed under the Proposed Action would contrast visually with the surrounding land even after completion of final reclamation. The Project area is located in an area of the California Desert Conservation Area (CDCA) designated Class L (Limited Use). Class L areas are generally managed to conform to the BLM Class II visual objectives (see Section 3.7.1). Based upon the visual effects of the Proposed Action described above and the BLM Class II visual objectives (i.e., to retain the existing character of the landscape) which have generally been applied to this area, the Proposed Action does not conform to the visual objectives. This lack of conformance is a significant impact.

4.1.7.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.7-1: Following completion of Project mining activities, all buildings, equipment, supplies, and debris shall be removed to improve the visual appearance of the Project area.

- 4.1.7-2: Dust suppressants shall be utilized, as necessary and in accordance with ICAPCD permit requirements, on haul roads to minimize fugitive airborne dust generation on the Project mine and process area.

- 4.1.7-3: In conformance with the Reclamation Plan as approved by the BLM and Imperial County, all disturbed areas shall be recontoured and reseeded or revegetated with native or indigenous species complementary to vegetation found in the surrounding area.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

No specific measures.

Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts:

- 4.1.7-4: High intensity lighting used for mining and processing operations at night shall be directed downward to reduce fugitive light. Lighting shall have reflectors or shields to further minimize fugitive light. Light stanchions shall be no higher than necessary for safe and efficient lighting.

- 4.1.7-5: Applicant shall establish a working relationship with the U.S. Marine Corps (USMC) to ensure that nighttime lighting of the Project mine and process area does not substantially interfere with the use of Night Vision Devices (NVD) in the vicinity of the Project area or nighttime overflight operations within flight corridor VFR-299. As part of this mitigation measure, Applicant shall provide the USMC Air Station, Yuma, Arizona, with a detailed, to-scale, map of the Project area identifying the principal surface facilities, transmission lines, and locations of potential light sources to enable the USMC to avoid or accommodate these areas during nighttime flight activities.

4.1.7.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would result in unavoidable physical changes in the existing contour and character of the Project area. These changes would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Proposed Action. These physical changes to the area would be permanent, but would continue to lessen following the completion of final reclamation as natural processes continued to soften the line and form to and match the surrounding landscape. These residual impacts to the visual character of the Project area are judged to be significant and unmitigatable.

The Proposed Action would result in a visual contrast with the surrounding area and would change the existing character of the landscape to a degree which would not conform with the BLM Class II visual objectives which have been applied to this Class L-designated area. This lack of conformance is a significant, unmitigatable impact.

4.1.8. Noise

4.1.8.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Would have the potential to result in a significant increase in noise levels to sensitive receptors in the area; or

- Conflict with any applicable noise restrictions imposed by regulatory agencies.

4.1.8.2. Impacts of the Proposed Action

The Proposed Action would not conflict with any applicable noise restrictions imposed by regulatory agencies.

The noise generated by the proposed mining operations would be typical of most construction and mining projects, and could be intense for short intervals. Ore loading and handling, and other mining processes, can generate noise levels up to 95 dB(A) at 25 feet, although typical average noise levels generated by Project operations (which continue 24 hours per day, seven (7) days per week) could be substantially lower. Safety backup alarms on haul truck and other major equipment may generate 100 dBA at 25 feet, and blasting (which the Proposed Action restricts to daylight hours) can cause very short-duration noise levels in excess of 140 dBA at 25 feet.

Noise is attenuated by distance, atmospheric conditions, and topography. Sound wave divergence typically results in a six (6) dBA decrease for every doubling of distance from a noise source (ICPBD 1978). This assumption is conservative since it does not account for noise attenuating factors such as topography, wind, temperature gradients, atmospheric pressure, and other site-specific factors, such as the upward deflection of noise generated down in the bottom of a pit. Assuming a typical peak noise levels from the day-to-day Project activities within the Project mine and process area of 95 dBA, and assuming a typical noise source location near a point of public access (the center of the South Waste Rock Stockpile, approximately 1,600 feet from Indian Pass Road), then the peak ambient background noise at the nearest point of public access would be approximately 60 dBA. Peak ambient background noise levels (50 dBA to 30 dBA) would be expected to be approached at a distance of approximately one-half (½) to five (5) miles, respectively, from the Project mine and process area from these activities. Typical average noise levels generated by Project operations would be expected to be substantially lower. Substantially higher level noise values would be expected during the instant when blasting occurs.

There are no permanent noise-sensitive receptors (i.e., residences, schools, hospitals, etc.) located in the vicinity of the Project area. The nearest permanent noise-sensitive receptors are located at the Gold Rock Ranch, approximately seven (7) miles southwest of the Project mine and process area. Based upon the projected attenuation of noise with distance, sound pressure levels generated from all normal operating activities at the Project mine and process area should not be audible at this receptor. However, the short term, higher level, noise values generated by blasting may be audible and distinguished from natural noise sources, but would be similar to those generated from the existing military overflights. While some Project-generated noise levels may be discernable, the projected noise levels would not be intrusional and noise impacts would be below levels of significance.

Temporary or transient noise receptors, such as dispersed recreational uses in the area around the Project mine and process area, including portions of the Indian Pass Wilderness Area and the Picacho Peak Wilderness Area, would be exposed to audible noises generating by Project activities, depending on their distance from the Project mine and process area, their location, local conditions, and the specific activities being undertaken by the Project. While some Project-generated noise levels may be barely discernable, other noises and noise levels would likely be judged intrusional, and some of these receptors may decide to avoid the areas surrounding the Project mine and process area, and instead use other recreational areas, during the life of the Project, especially during

weekends of heavy recreational use. The effects of Project noise alone on dispersed recreational users are judged significant because of blasting on weekends of heavy recreational use; however, see Section 4.1.9.2 for the assessment of all Project effects on recreational use.

The effects of project generated noise on wildlife is discussed in further detail in Section 4.1.5.3.

4.1.8.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.8-1: All heavy equipment, drilling rigs, and other internal combustion engines shall be equipped with mufflers to minimize noise generated during construction, operation and reclamation activities.

<u>Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.8-2: Applicable Occupational Safety and Health Administration (OSHA) worker noise protection requirements, as set forth in 29 CFR 1910.95, *et seq*, and California Occupational Safety and Health Administration (Cal-OSHA) requirements, as set forth in 8 CCR 5095, *et seq*, shall be implemented by the Applicant.

<u>Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.8-3: Blasting shall only be conducted during daylight hours unless required for safety reasons. During the months of October through March, the Applicant shall take all reasonable steps to avoid blasting on weekend days (Saturday and Sunday), and shall not blast on the following major recreational holidays (Thanksgiving [Thursday through Sunday]; Christmas [Christmas day and all associated weekend days]; New Years [New Years eve, New Years day, and all associated weekend days]; and President's Day [and associated weekend days]) unless required for safety reasons or necessary to maintain production due to the mechanical breakdown of production equipment or other unforseen circumstances. Prior to conducting blasting on any of these designated weekend days or major holidays, Applicant shall on that day notify the BLM and take reasonable steps to notify those recreational users of the public lands located along Indian Pass Road or within one (1) mile of the boundary of the Project mine and process area boundary of the approximate time that blasting will occur.

4.1.8.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would result in unavoidable increases in ambient noise levels within a conservatively estimated five-mile radius of the Project mine and process area over the life of the Project. Noise levels would diminish with distance from Project noise sources, and ambient noise would decrease with time as the pit walls, heap, and waste rock stockpiles provide increasing topographic attenuation of sound levels from noise sources within the Project mine and process area.

Based on the absence of sensitive noise receptors in the vicinity of the Project area, the effects of noise from the Proposed Action would be below the level of significance.

4.1.9. Land Use

4.1.9.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

This land use impact assessment evaluates the potential effects of the Proposed Action on existing and planned land uses in the vicinity of the Project area. It also evaluates the effects of the Proposed Action on wilderness and recreational resources in the Project area and vicinity. The Proposed Action would normally have a significant effect on the environment if it would:

- Conflict with adopted environmental plans and goals of the community where it is located;
- Disrupt or divide the physical arrangement of an established community;
- Conflict with established recreational, educational, religious or scientific uses of the area;
- Result in nonconformance with the Wilderness Act of 1964 or the BLM Interim Wilderness Management Policy;
- Substantially degrade or reduce the quantity or quality of the area available for existing or future recreational opportunities; or
- Result in the unmitigated loss of a unique recreational resource.

The effects of the Proposed Action would also be significant if the Project was incompatible with existing land uses in the vicinity, or if the effects of the Proposed Action would not be in conformance with the applicable land use plans and policies described in Section 3.9.1.

4.1.9.2. Impacts of the Proposed Action

In addition to other changes, this section has been modified from the November 1996 Draft EIR in response to comments to: provide additional information regarding the impacts of the Proposed Action on recreational uses in the area, including recreational use of the wilderness areas.

Compatibility with Existing Land Uses:

The Project area is undeveloped and the area surrounding the Project area is occupied by large expanses of public land administered by the BLM. The area is relatively isolated and remote from concentrated land uses. The area is generally regarded as open space, providing desert habitat for wildlife and dispersed recreational opportunities. The principal land uses in the vicinity of the Project area include: dispersed recreation (hunting, camping, rock collecting, etc.); military aircraft overflight training; and commercial mineral exploration. Two (2) wilderness areas (Indian Pass Wilderness Area and Picacho Peak Wilderness Area) are located approximately one and one-half (1½) miles north and one-half (½) mile northeast, respectively, of the Project mine and process area at their closest points; compatibility of these wilderness areas with the Proposed Action is discussed in the subsection entitled "Wilderness Areas," below. Indian Pass ACEC is located approximately three-quarters (3/4) of a mile north of the Project mine and process area; compatibility of the cultural resource values for which the Indian Pass ACEC was established is discussed in Section 4.1.6.2. The impact of the Proposed Action on dispersed recreation within the area is discussed in the subsection titled "Recreational Resources," below. There are no current plans to include the Project area in any park system.

Three (3) precious metal mines (American Girl/Oro Cruz Mine, Mesquite Mine, and Picacho Mine) are located within ten (10) miles the Project mine and process area; the Proposed Action would have no impact on these existing mines. The nearest residence and area of concentrated public activity is the Gold Rock Ranch, located approximately seven (7) miles southwest of the Project mine and process area. The Proposed Action is compatible with this existing use, since the Project would result in negligible increases in noise and traffic along Ogilby Road, and would result in negligible decreases in air quality, for the residents and visitors at Gold Rock Ranch. No other residences exist within ten (10) miles of the Project mine and process area.

The new transmission lines could pose a potential physical hazard to low-flying military aircraft, especially during nighttime exercises when pilots are training with night vision devices (NVD) which substantially amplify the available light; the Proposed Action includes the installation of special devices which are visible only at night with the use of NVD (see Section 2.1.9.3.1). Project night lighting could present a similar hazard to the use of NVD; a mitigation measure to reduce the impact of this lighting to below the level of significance is provided in Section 4.1.7.3. However, Project blasting during mining operations could be a significant potential hazard to low-flying military aircraft using the general area for training exercises.

Expanded discussions of the potential effects of the Project on surrounding area are provided in the other sections of this Chapter 4 of the EIS/EIR.

Compatibility with Adopted Land Use Plans and Policies:

In passing the Federal Land Policy and Management Act of 1976 (FLPMA), "... Congress declared that the policy of the United States would be to manage public lands to protect the quality of various natural resources, outdoor recreation and human occupancy and uses." (Section 102(a)(8)) The policy statement went on to include "... (12) the public lands [shall] be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands including implementation of the Mining and Mineral Policy Act of 1970 ... as it pertains to the public lands; ...." [Section 102(a)(12)].

FLPMA defines multiple use as "... management of the public lands and their various resource values so that they are utilized in the combination that would best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and condition; ...." The definition goes on to allow some areas to be managed for less than all the resources. "... a combination or balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values ..." is also a part of a multiple use. [Section 103 (c)].

Primary or major uses are defined as those which "... includes and is limited to domestic livestock grazing, fish and wildlife development and utilization, mineral exploration and production, rights-of-way, outdoor recreation, and timber production. [FLPMA Section 103(1)].

The California Desert Conservation Area (CDCA) Plan is a multiple use, sustained yield plan developed to manage various resources including mineral development [FLPMA Section 601(d)]. The Proposed Action is consistent with the CDCA Plan. Therefore, it is consistent with Section 601(a)(4) and Section 601(b) of FLPMA. In addition, Section 601(f) of FLPMA did not amend the 1872 Mining Law to preclude mineral development or production within the CDCA. The development of locatable minerals on mining claims in areas designated by the BLM as Class L is authorized subject to applicable federal regulations (43 CFR 3809) and state and local laws.

The overbuilding of the existing 34.5 kV transmission line is in conformance with the respective goals and objectives set forth in both the Land Use Element and the Conservation and Open Space Element to the General Plan. The County has also zoned the entire area of the Proposed Action as S-Open Space, which permits multiple uses consistent with the Conservation and Open Space Element and the General Plan.

The proposed Project is in conformance with the Southern California Association of Governments (SCAG) Regional Comprehensive Plan and Guide (RCPG) (SCAG 1997).

Wilderness Areas:

The northern boundary of the Project mine and process area is located approximately one-half (½) mile southwest of Picacho Peak Wilderness Area, and approximately one and one-half (1½) miles south of Indian Pass Wilderness Area. The Proposed Action would not result in any surface disturbance within, or other direct impacts to, either wilderness area. However, major facilities within the Project mine and process area would be visible from some elevated areas within both Indian Pass Wilderness Area and Picacho Peak Wilderness Area (see Section 4.1.7). Minor increases in annual ambient levels of particulate matter would result in the wilderness areas from Project emissions (see Section 4.1.4). Blasting and other noises generated by Project operations within the Project mine and process area would be audible within those portions of the wilderness areas nearest the Project mine and process area (see Section 4.1.8.2). Indian Pass Road, the primary access to these wilderness areas from the west, would be realigned around the Project mine and process area over the life of the Project, and would be returned to approximately its original location after the completion of mining activities. However, the road would be kept open and would not restrict travel to the wilderness areas.

Section 103(d) of the California Desert Protection Act of 1994, which created both Indian Pass Wilderness Area and Picacho Peak Wilderness Area, reads:

> "No Buffer Zones.--The Congress does not intend for the designation of wilderness areas in section 102 of this title to lead to the creation of the protective perimeters or buffer zones around any such wilderness area. The fact that nonwilderness activities or uses can be seen or heard from areas within a wilderness area shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area."

Accordingly, only the direct effects of the Proposed Action on these wilderness areas can be assessed for their effects on wilderness values themselves; the indirect effects of the Proposed Action on these wilderness areas must be evaluated without reference to the areas' wilderness characteristics and values. Based upon the lack of direct impacts to these wilderness areas from the Proposed Action, the impacts to wilderness areas from the Proposed Action are below the level of significance.

Recreational Resources:

The entire Project mine and process area (approximately 1,571 acres) would be fenced and closed to the public during the entire operating life of the Project, which would eliminate these lands from any recreational use during this period. Following the completion of mining operations, surface facilities (buildings, roads, process facilities and ponds, etc.) and foundations would be removed, and final reclamation activities (grading and rounding of waste rock stockpiles and the heap,

revegetation, installation of guzzlers, etc.) commenced. With the completion of final reclamation, the perimeter fence would be removed and public access to the area reestablished, except for the 198-acre area of the open East Pit, which would be surrounded by a rock boulder barrier to prevent vehicle access and discourage pedestrian access. As discussed in Section 4.1.5, both vegetation and wildlife habitat values would slowly recover, and opportunities for hunting, hiking, camping and other dispersed recreational activities would again be available in the Project mine and process area (with the exception of the 198-acre open East Pit).

Construction and operation of Project facilities within the Project mine and process area would not prevent camping, hunting or other dispersed recreation activities in areas outside of the fenced boundary of the Project mine and process area. Most recreational activities in the immediate vicinity of the fenced Project mine and process area would, however, be affected by Project activities conducted during the projected 20-year life of the Project within the Project mine and process area. Dispersed recreation would be affected by emissions of air pollutants (see Section 4.1.4), visibility of the mine components (see Section 4.1.7), noise generated by mine operations (see Section 4.1.8.2), and Project-related traffic on Indian Pass Road (and possibly Ogilby Road) (see Section 4.1.11.1.2), even though mitigation measures to reduce the effects of these air emissions, visibility, noise, and traffic impacts are presented in the respective sections of the EIS/EIR. As a result of these effects of the project, dispersed recreational use of the areas adjacent to the Project mine and process area would likely be reduced during the life of the Project. Environmental education activities currently conducted in the vicinity of the Project mine and process area, specifically the viewing of cultural resources, would likely also be substantially reduced or displaced by the Project during the life of the project and after because some of the cultural resources would be inaccessible, while others would be permanently lost.

Recreational users of those portions of Picacho Peak Wilderness Area and Indian Pass Wilderness Area closest to the Project mine and process area would almost certainly hear noises generated by the Project and see the major features of the Project during the day (and lights from the Project mine and process area during the night). Although the noise and lights would last only through the estimated 20-year life of the Project, the daytime views of the (reclaimed) Project features (waste rock stockpiles, heap, and open pit) would be permanent. People who go into wilderness areas such as these usually go there because of the solitude and the lack of human-related distractions. Noise and lights, especially at night, from the Project mine and process area would likely reduce the use of these wilderness areas by people seeking this solitude. Other recreational users of the area may not be as adversely affected by the Project noise and lights as the wilderness users.

Project facilities constructed outside of the Project mine and process area, including the buried water pipeline, water wells, and the new transmission line, would not affect public access to the primitive campsites along the washes adjacent to Indian Pass Road in the Indian Pass recreational corridor, and Project operations would not encourage or overly restrict recreational traffic traveling on Indian Pass Road to or from the wilderness areas or other potential recreation areas located north of the Project mine and process area. However, vehicle campers along the Indian Pass recreation corridor adjacent

to Indian Pass Road and the Project ancillary area would be most affected by Project-related noise, lights, and Project-related vehicle traffic along Indian Pass Road, as well as the loss of access to the microphyll woodland habitat located within the Project mine and process area. As a result, informal overnight camping in the Indian Pass recreation corridor would probably diminish during the projected 20-year life of the Project, especially for those people with two-wheel drive vehicles that cannot travel far from Indian Pass Road. Campers would also likely be displaced and disturbed by the noise and activities created during pre-mining construction activities associated with the new transmission line and ground water system. Following the completion of reclamation activities within the Project mine and process area, the new transmission line would be removed, the water wells would be abandoned in conformance with agency requirements, and the buried water pipeline would be abandoned in place. As a result, little residual effect on vehicle camping within the Indian Pass recreational corridor would be likely beyond the life of the Project.

There are no unique recreational resources within the Project area, and comparable recreational opportunities would still be available in large areas of public land similar to, but outside of, the Project area. There are no current plans for the Project area to be incorporated into either the state or federal park system. There are approximately 4.4 million acres of BLM Class L lands in the CDCA which are generally available for dispersed recreation. Given the availability, both nearby and in other areas of eastern Imperial County, of large areas with similar, although not identical, opportunities for dispersed recreation, the effects of the Project on recreation resources would be below the level of significance.

While not intended, the proximity of the Project mine and process area to Indian Pass Road could attract some visitors to the area as sightseers to observe the large mine equipment and active mining operations.

4.1.9.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.9-1: At the conclusion of mining activities, consistent with the approved Reclamation Plan, Applicant shall recontour all disturbed areas except the pit slopes as appropriate to create undulating land forms that are stable, safe, do not allow for any pooling or ponding, and blend with the surrounding undisturbed topography. Applicant shall also construct a loose rock barricade comprised of large boulders to prevent vehicle access and restrict public entry into the open pit area(s).

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.9-2: Applicant shall conduct mining operations in conformance with the Class L BLM multiple land use guidelines outlined in the CDCA Plan for mining in the area. The Applicant shall also comply with the federal land use requirements prescribed in 43 CFR 3809.

Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts:

- 4.1.9-3: Applicant shall keep the USMC air station in Yuma, Arizona apprized of the current schedule and location for blasting at Project mine and process area to minimize the potential for low-flying military aircraft to be over the Project mine and process area during blasting activities.

4.1.9.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would result in an unavoidable change to the existing land use in the Project mine and process area from open space to mining over the 20-year life of the Project. Following completion of mining and reclamation activities, the majority of the Project mine and process area would be available again as open space. However, public access to the 198-acre open East Pit area would be indefinitely restricted by a loose rock-rubble barricade.

The Proposed Action would reduce the area otherwise available for use by low-flying military aircraft, especially during nighttime exercises when pilots are training with night vision devices (NVD), during the life of the Project; mitigation measures are available to reduce this impact to a level which is less than significant, and this effect would be eliminated following the completion of final reclamation.

Areas in the immediate vicinity of the Project mine and process area, including some portions of the nearby wilderness areas, would be unavoidably affected by emissions of air pollutants and noise from the Proposed Action, and portions of the Proposed Action would be easily visible from immediately adjacent or elevated locations. Project-related traffic would also unavoidably affect users of the land in the immediate vicinity of the Project area. These effects would be less than significant on the nearby wilderness areas, and would also be less than significant on the dispersed recreational resources.

4.1.10. Socioeconomics

4.1.10.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Induce substantial growth or concentration of population;
- Displace a large number of people;
- Cause a substantial reduction in employment;
- Substantially reduce wage and salary earnings; or
- Cause a substantial net increase in County expenditures.

4.1.10.2. Impacts of the Proposed Action

A net beneficial socioeconomic effect is projected from the construction and operation of the Proposed Action.

The Proposed Action is expected to create jobs for 120 full-time employees, as many as 40 of which could be filled by the current employees of the Picacho Mine, which would be closing. Initial construction may require as many as 225 workers, although only a portion of these would be working on the Project at any single time. During the Project life, additional construction projects (such as the construction of an additional phase of the heap leach pad) may require up to 40 workers. Construction of the overbuilt 92 kV/34.5 kV transmission line would require up to 30 workers.

Indirect employment opportunities generated by the Proposed Action were estimated by applying multipliers commonly used in the mining industry. Dobra (1988) assumes that for every job created in the mining industry, an additional 1.25 job opportunities are created in other sectors of the economy. Using this factor, the Project is estimated to create, or continue in existence, 150 jobs. The majority of these jobs would be expected to be filled by current residents of Imperial County, California or Yuma County, Arizona, although there may be a very small increase in demand for housing and community services in these areas over the life of the Project if some of the jobs are filled by workers from outside these areas. Based exclusively on the distance required to drive from the Project mine and process area to Yuma (35 miles) versus Holtville (52 miles), Brawley (56 miles), and El Centro (65 miles), it is likely that more workers would eventually reside in Yuma, Arizona over locations in the Imperial County.

The following estimates of Project expenditures and estimated tax revenues from the Project were provided by Glamis Imperial (Personal Communication, C.K. McArthur, Chemgold, Inc., 1995; Personal Communication, Steve Baumann, Glamis Imperial, 1996).

- Project annual payroll, including benefits, is estimated to be approximately $7 million for 120 employees.

- Approximately $48 million in capital would be expended for the Project during 1998. Sales tax on these capital expenditures would amount to approximately $3.72 million. For each year thereafter, average annual capital expenditures would amount to approximately $1.7 million, generating approximately $0.13 million per year in sales tax for capital expenditures only.

- Annual non-capital expenditures are estimated to total $26 million (including payroll).

- Geographic distribution of annual non-capital expenditures have been estimated using data derived from the Picacho Mine operations. It is estimated that 37.1 percent ($9.65 million) of non-capital expenditures would be made in California and 38.1 percent ($9.9 million) would be made in Arizona, for an estimated total of 75.2 percent ($19.55 million) in local non-capital expenditures. The remaining 24.8 percent ($6.45 million) of non-capital expenditures would be made in areas outside of California and Arizona.

- Property taxes in Imperial County are assessed at approximately 1.1 percent per year of the total assessed value. Depending on the assessed valuation of the Project property, projected property taxes are estimated to range between $250,000 and $600,000 per year.

Based upon the information provided above, the Proposed Action would not induce substantial growth or concentration of population; displace a large number of people; cause a substantial reduction in employment; or substantially reduce wage and salary earnings, and thus the Proposed Action would not result in a significant adverse socioeconomic effect. Based on the analyses presented in Section 4.1.11.1.2 and Section 4.1.11.3.2, the Proposed Action would also not cause a substantial net increase in County expenditures, and would not be considered significant.

4.1.10.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

No mitigation measures are proposed or recommended.

4.1.10.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

There would be no unavoidable adverse socioeconomic effects from the Proposed Action. Beneficial socioeconomic effects would result from the Proposed Action in the form of employment opportunities, tax revenues and increased spending in the local region for goods and services by Project employees and contractors. The adverse socioeconomic effects of the Proposed Action would be below the level of significance.

4.1.11. Roads and Public Services

4.1.11.1. Road and Transportation System

4.1.11.1.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system; or

- Prevent or substantially reduce public access through the elimination of important existing routes of travel.

4.1.11.1.2. Impacts of the Proposed Action

The Proposed Action would require the realignment of an approximate 6,000-foot section of Indian Pass Road around the western perimeter of the Project mine and process area to allow for excavation of the West Pit in the current road location. The relocated road would cross the adjacent "West Pit West" wash "at-grade" at two (2) locations; one (1) upstream and one (1) downstream of the Project mine and process area; to allow for the safe passage of traffic during mine operations.

The Proposed Action includes maintaining Indian Pass Road open to the public during construction of the relocated portion of the road; posting signs at the two (2) wash crossings along the relocated portion of Indian Pass Road warning drivers not to cross the wash when flooded; and undertaking emergency repairs or maintenance if Indian Pass Road is damaged by flooding where it crosses these washes.

Because "West Pit West" wash is subject to infrequent flooding, Indian Pass Road would be subject to temporary closure during the period that Indian Pass Road is realigned and this wash is flowing. An alignment of Indian Pass Road which does not cross the wash (that is, which is entirely on the east side of the wash) is the best location to minimize long-term maintenance costs and environmental effects. Accordingly, at the request of the ICPWD, the Proposed Action includes returning the realigned section of Indian Pass Road to a location within the Project mine and process area east of and approximately parallel to the diverted "West Pit West" diversion channel. This location would be on land previously disturbed by Project activities adjacent to the "West Pit West" diversion channel. Once Indian Pass Road had been realigned and the reclamation bond for this work released by the agencies, maintenance on Indian Pass Road reverts to Imperial County. The impacts

to Indian Pass Road, and to the public's use of Indian Pass Road, from the road realignment and subsequent relocation would be below the level of significance.

The Proposed Action would also result in the realignment of the intersection of Indian Pass Road and Ogilby Road to change the acute angle of the intersection to a right angle. The section of Indian Pass Road which would be replaced would be reclaimed under the Proposed Action. The net effect to the road system of realigning the road intersection would be beneficial, and any adverse environmental effects resulting from realigning the intersection would be below the level of significance.

Fencing of the Project mine and process area boundary, and construction of the Project facilities within the Project mine and process area, would necessitate the closure of several unmaintained dirt "routes" identified on BLM Desert Access Guide 21 (Midway Well) which pass through the Project mine and process area (see Figure 2.8), at least until the Project perimeter fence is removed following the completion of final reclamation. However, as also shown on Figure 2.8, alternative open routes are available in the immediate vicinity of the Project mine and process area which would allow vehicles to travel from Indian Pass Road to Hyduke Road, and to drive around the Project mine and process area. Therefore, the closures of these routes, either temporarily or permanently, would not result in a significant effect.

The Proposed Action would result in an estimated 47 light-weight vehicle round-trips to the Project area daily, and an estimated average three and one-half (3½) heavy-weight vehicle round-trips per day. This represents approximately a five (5) percent increase in the volume of traffic currently observed on Ogilby Road south of its crossing of the Southern Pacific railroad tracks and north of the exit off Interstate Highway 8. This estimate assumes that approximately 25 percent of the estimated 64 workers which would be scheduled to work on any given day voluntarily carpool to the Project area, which is consistent with the experience with other mines in the area. Traffic volume could be higher if fewer workers carpoolled, and would somewhat higher during the approximately six (6) month construction period as a result of the additional workers and truck traffic. Truck traffic on Ogilby Road associated with the Project would not substantially increase degradation of the roadbed, nor result in a substantial increase in maintenance costs for this road.

Although no traffic counts are available for either Ogilby Road in the vicinity of the Project, or for Indian Pass Road, traffic volume is believed very light on both roads. Project employees would work staggered shifts and different work periods. This would result in dispersed traffic flow to and from the Project area throughout the day. The Proposed Action also contains the realignment of the intersection of Ogilby Road and Indian Pass Road to a right angle. Thus, there is no reason to believe that the construction of either a right- or left-hand turn pocket on Ogilby Road is necessary. The effects of traffic associated with the Proposed Action would be below the level of significance.

Neither BLM Hyduke Road nor the open routes of travel were constructed for heavy vehicle use, and moderate to extensive upgrade of these roads would be required to permit heavy vehicle traffic. The

Proposed Action states that none of these roads in the vicinity of the Project mine and process area would be used for heavy truck or equipment traffic.

Fencing of the Project mine and process area (and construction of the Project facilities) would close several BLM open routes of travel currently located within the Project mine and process area. In addition, the BLM would close those sections of these same BLM open routes of travel located outside the Project mine and process area which would be then end at the Project mine and process area fence. However, public vehicular access to all areas around the Project mine and process area is still available to the public on all sides of the Project mine and process area from BLM routes of travel, Indian Pass Road, and Hyduke Road, which would remain open (see Figure 2.8). During the life of the Project, Glamis Imperial would be responsible, under the direction of Imperial County, for the maintenance of Indian Pass Road from Ogilby Road to a point beyond the Project mine and process area. Any costs associated with possible increase in road repairs required as a result of increased Project-related traffic on County-maintained paved roads would be off-set by the additional property taxes and sales taxes provided to the County by the Project. Thus, the level of impacts to roads, and the impacts to public access in the vicinity of the Project, would be below the level of significance.

Construction of the water wells, water pipeline, and new transmission line in the Project ancillary area would require the construction of some new access roads and "spur" roads. Following the completion of final Project reclamation, Project facilities constructed within the Project ancillary area would be removed (or, in the case of the buried pipeline, buried in place), and these access and "spur" roads reclaimed. In addition, the haul and maintenance roads within the Project mine and process area to the open pit would be reclaimed. However, the contrast between the reclaimed roadbeds and the surrounding areas may encourage public use of these closed roads in areas where darkly "varnished" desert pavement was disturbed. This is considered to be an insignificant effect, although a measure is proposed to mitigate the impact further.

4.1.11.1.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.11.1-1: Applicant shall realign an approximate 6,000-foot section of Indian Pass Road around the Project mine and process area prior to surface disturbance which would impede through traffic on this road, and shall maintain Indian Pass Road open to the public during construction of the relocated portion.

- 4.1.11.1-2: Applicant shall not route heavy traffic over Hyduke Road.

- 4.1.11.1-3: That section of Indian Pass Road realigned prior to mine construction shall be realigned to a location east of and approximately parallel to the diverted West Pit West diversion channel as soon as practicable, but prior to the completion of final reclamation and release of the physical reclamation bond.

- 4.1.11.1-4: Applicant shall post warning signs at the two (2) wash crossings along the relocated portion of Indian Pass Road warning drivers not to cross the wash when flooded, and shall undertake repairs or maintenance, as may be necessary and authorized by Imperial County, if Indian Pass Road is damaged by flooding where it crosses these washes.

- 4.1.11.1-5: Applicant shall apply water and/or dust suppressants (chemical treatments acceptable to all appropriate agencies) to Indian Pass Road from its intersection with Ogilby Road to the boundary of the Project mine and process area.

- 4.1.11.1-6: Applicant shall acquire the necessary approvals of the BLM and Imperial County to construct the relocated section of Indian Pass Road and the realigned intersection of Indian Pass Road and Ogilby Road, and shall design, construct and maintain these facilities in accordance with the permit conditions which are applicable at the time of construction.

- 4.1.11.1-7: Applicant shall encourage employees and construction workers to carpool to the Project area.

- 4.1.11.1-8: Applicant shall maintain Indian Pass Road from the intersection with Ogilby Road to the point immediately northeast of the Project mine and process area, including the section of the road relocated by the Project, during the active life of the Project in consultation with the Imperial County Public Works Department.

<u>Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts</u>:

No specific measures.

<u>Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts</u>:

No mitigation measures are proposed.

<u>Other Mitigation Measures</u> (These are measures which may further reduce the impacts of certain effects which are below the level of significance without mitigation):

- 4.1.11.1-9: To reduce the potential that access and "spur" roads constructed to provide temporary access to the new transmission line, water pipeline, and water wells may continue to be used by

the public following the completion of Project reclamation, these roads, when constructed in areas of dark "desert varnished" desert pavement, shall be reclaimed in a manner, such as the application of Permeon, to reduce the visual contrast between the disturbed area and the surrounding undisturbed dark desert pavement.

4.1.11.1.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would result in a slight, unavoidable, and less than significant increase in traffic on, and traffic-generated fugitive dust from, public roads in the vicinity of the Project area over the 20-year life of the Project. The Proposed Action would also result in the closure of several currently open "routes" in the immediate vicinity of the Project mine and process area, which would also not result in a significant effect. When mitigated, the effects of the Proposed Action on traffic and the local transportation system in the vicinity of the Project area would not exceed levels of significance.

4.1.11.2. Utilities

4.1.11.2.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Encourage activities requiring large amounts of fuel, water, or energy;
- Use fuel, water, or energy in a wasteful manner;
- Breach published national, state, or local standards relating to solid waste or litter control; or
- Extend a sewer trunk line with capacity to serve new development.

4.1.11.2.2. Impacts of the Proposed Action

Extending utility electrical service to the Project area would require the "overbuilding" of approximately sixteen (16) miles of existing IID 34.5 kV transmission line with a new 92 kV/34.5 kV transmission line in the corridor from Interstate Highway 8 to the existing transmission line's intersection with Indian Pass Road. In addition, in the Project ancillary area, approximately 3.7 miles of new 92 kV transmission line, underbuilt with a 13.2 kV distribution line, would be constructed from the intersection with the overbuilt 92 kV/34.5 kV transmission line to a step-down substation to the constructed in the Project mine and process area. The existing 34.5 kV transmission line would remain in service while the overbuilt 92 kV/34.5 kV transmission line was

being built, so there would be no interruption of service for existing customers. Following the completion of mining and reclamation, the 92 kV/13.2 kV transmission line would be removed, but the overbuilt 92 kV/34.5 kV transmission line would remain under the ownership of the local utility. Because there would be no interruption in service, and the electrical utility system would be upgraded, there would be a net positive effect on the electric utility system.

During periods of utility service interruption, an on-site, ≥750 kW, diesel-powered generator would be used to provide emergency power for essential loads and services.

No telephone utility services are directly available to the Project area. A telephone communications relay to existing Black Mountain communication facilities would be installed to provide telephone service to the offices and maintenance shop via a microwave system which would be located within the Project area. Field communications would be provided by an FM mine communication system. The use of the microwave system and/or the FM mine communication system should not interfere with pilot communications during military overflights of the Project area and vicinity since these systems would be on different frequencies. This would not be a significant effect of the Proposed Action.

No utility-provided natural gas service is available to the Project area, nor would the existing system be adversely affect in other areas by the Proposed Action.

No utility-provided water services are available to the Project area. Water for mine operations and fire protection requirements would be produced from ground water wells constructed southwest of the Project area and piped in a buried pipeline to the Project area. The produced water would be stored in an on-site water storage tank for mining and fire protection requirements. Water collected in the open pits would be used where possible for roadway dust suppression purposes. Accordingly, there would be no adverse effect on water utility systems as a result of the Proposed Action.

The Proposed Action is not expected to generate significant population growth (see Section 4.1.10.2), and therefore any significant demand for local utility services, in the communities in which any Project employees and/or contractors, and their respective families, who may relocate for their job with the Project.

All portable and salvageable structures would be removed and taken off-site. Any permanent below-grade structures and all foundations would be removed, except the buried water pipeline and the process pond liners, and disposed of in a landfill authorized to accept these materials. All surplus materials, storage containers and trash would be transported to a landfill authorized to accept this material. The remaining waste products, and all surplus fuel oil and other materials, would be removed from the Project area and disposed of according to then-current state and federal regulations. Given the relatively small volumes of waste to be disposed of off-site, the Proposed Action would not result in a significant effect on the local and regional landfills and regulated or hazardous waste treatment or disposal facilities.

4.1.11.2.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.11.2-1: Applicant shall make available an on-site, diesel-fuel generator to meet emergency power needs for essential loads and services during periods of utility-provided electrical service interruption.
- 4.1.11.2-2: Applicant shall, at the end of the active life of the Project, remove all below-grade structures and all foundations, including the process pond liners; transport all surplus materials, storage containers and trash to a reuse or recycle facility, or to a landfill, authorized to accept this material; remove all remaining non-mining waste products, all surplus fuel oil, and other materials from the Project mine and process area and dispose of them according to then-current state and federal regulations.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.11.2-3: Applicant shall acquire the necessary approvals of the BLM, Imperial Irrigation District, and other appropriate agencies to construct the 92 kV transmission line over the existing 34.5 kV transmission line, and shall design, construct and maintain this transmission line in accordance with the conditions of these permits, including avoiding the disturbance of any new surface areas during construction.

Mitigation Measures Proposed to Avoid or Reduce Potentially Significant Impacts:

No measures are proposed or recommended.

Other Mitigation Measures (These are measures which may further reduce the impacts of certain effects which are below the level of significance without mitigation):

- 4.1.11.2-4: Applicant shall work with the USMC to ensure that neither the microwave communication system nor the Project FM mine communication system interfere with military overflight communications.

4.1.11.2.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would result in the consumption of utility-provided electrical power, which would not be adverse or significant. No other public utility services (except utility-provided telephone service, once connected with the microwave communication system) would be utilized by the Project, and the potential adverse effects of the Project communication systems on USMC use of the Project area would be mitigated to insignificance. Therefore, the effects of the Proposed Action on utility services would not exceed the level of significance.

4.1.11.3. Public Services

4.1.11.3.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Create a substantial demand for public services.

4.1.11.3.2. Impacts of the Proposed Action

No public or community services are available in the Project area. Septic treatment systems with leach drain fields would be constructed near the office and shop facilities, near the processing and laboratory facilities, and near the lime storage facilities. Produced ground water stored on the Project mine and process area would be used for commodes and hand-washing. Bottled water would be provided for drinking water.

The Project mine and process area is located on the township line between T.13S., R.21E. and T.14S., R.21E., and between eight (8) and nine (9) GLO/BLM Cadastral Survey monuments are likely located within the Project mine and process area along the township line. (None of the sections adjoining the township line within the Project mine and process area are surveyed or monumented.) Although some of these township line monuments may be able to be protected and maintained, damage or destruction to others within the Project mine and process area is inevitable since several are located within the projected pit or waste rock stockpile boundaries.

The few Project employees and contractors, and their respective families, who may relocate to regional communities would produce a very small increase in the demand for public and community services. Most of these families would be expected to reside in either Imperial County, California or Yuma County, Arizona. Any costs associated with these minor increases in demand for public or community services would be off-set by the additional property taxes and sales taxes provided to the communities and counties by the Project and Project employees. The Proposed Action would thus

not result in a significant increase in population nor generate significant new demand for public or community services.

4.1.11.3.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.11.3-1: Applicant shall provide an on-site septic system for wastewater treatment, which shall be removed upon completion of Project activities.

- 4.1.11.3-2: When no longer required for Project operations, Applicant shall remove that portion of the 92 kV/13.2 kV transmission line owned by the Project.

- 4.1.11.3-3: Applicant shall provide potable water for hand washing and drinking purposes.

Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts:

- 4.1.11.3-4: Applicant shall obtain necessary permit(s) for on-site sanitary facilities from the Imperial County Department of Health Services.

- 4.1.11.3-5: To the extent feasible, all GLO/BLM Cadastral Survey monuments shall be avoided and protected from any accidental damage or destruction. All monuments which may be subject to either intentional or accidental damage or destruction within the Project mine and process area shall be perpetuated by the installation and survey of witness monuments, subject to the prior approval of the survey by the BLM Cadastral Survey and conformance with the applicable California codes, and documented with a record of survey.

Incorporated to Avoid or Reduce Potentially Significant Effects:

No measures are proposed or identified.

4.1.11.3.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would result in a very small increase in demand for public services, but these effects would be far below the level of significance.

4.1.12. Emergency Services and Public Safety

4.1.12.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Create a potential health hazard or involve the use, production, or disposal of materials which pose a hazard to people or animal or plant populations in the area affected;

- Interfere with emergency response plans or emergency evacuation plans.

4.1.12.2. Impacts of the Proposed Action

Design elements of the Project would minimize the need for off-site emergency services. The Proposed Action would not require routine patrol services by the police, as on-site personnel would patrol the Project mine and process area 24-hours per day, providing security. The Project heap leach pad, process facility, and solution ponds would be fenced with chain-link and barbed wire to prevent unlawful access. "No trespassing" signs and other warnings would be strategically located along the fenced perimeter of the Project mine and process area and the fenced ground water well sites. The "No trespassing" signs and fences would be removed following release of the reclamation bond. If needed, police services would be provided by the Imperial County Sheriff's Department. The nearest sheriff's substation is located in Winterhaven, approximately 30 road miles from the Project mine and process area.

Project facilities would be equipped with on-site fire protection systems. Fire services would also be available from the Imperial County Fire Department station at Winterhaven.

Mine chemicals/blasting agents and associated explosives would be stored in locked magazines in compliance with ATF and MSHA safety standards.

Relatively large volumes of hazardous, and potentially hazardous, chemicals would be transported to, and stored within, the Project mine and process area, including: blasting agents and explosives; solid sodium cyanide (during transportation) and liquid sodium cyanide (stored on-site); sodium hydroxide; hydrochloric acid; polymaleic acid; ammonium nitrate; diesel fuel; unleaded gasoline; and motor oil. The transport, storage, and handling of these materials have the potential to create adverse effects from spills into the environment and impact the safety of the public and Project employees.

Some of the chemicals and hazardous materials to be stored in the Project mine and process area are incompatible and reactive substances. In particular, a spill or mixing of sodium cyanide with an acid would result in the release of toxic hydrogen cyanide gas. The Proposed Action states that cyanide chemicals and acids would never be stored near each other, and the Project would implement triple-redundant procedures to ensure an event would not happen (Personal Communication, Steve Baumann, Glamis Imperial, 1997). Further, the use of these chemicals is a standard and common practice and a recognized potential hazard at precious metal mines using the heap leach process, and a potential hazard which employee training and good handling practices would be expected to prevent. It is extremely unlikely that the use of these chemicals within the Project mine and process area would pose any risk to individuals off-site. Therefore, the potential for the Proposed Action to create a hydrogen cyanide gas health hazard would be below the level of significance.

There would be a potential for public safety-related impacts due to the transport of hazardous chemicals to the Project area via public highways and access roads. The probability of hazardous chemical spillage occurring due to a transport accident is considered low, but the potential for occurrence cannot be entirely eliminated. The potential for a spill of sodium cyanide during transportation to the Project mine and process area to create result in a substantial hazard to public safety or the environment is extremely low since the sodium cyanide would be transported to the Project in a solid, briquette form in sealed tanker trucks. A hazardous material spill contingency plan would be prepared by the Applicant to respond to potential hazardous material and chemical spills within the Project area. All transporters of hazardous materials for the Project are governed by State and federal regulations regarding the transportation of hazardous materials on public highways. Hazardous materials transporters are required to have special permits and licenses, and receive extensive hazardous materials (HAZMAT) training which prepares them to effectively manage spill incidents. Trucks which transport hazardous materials are equipped with safety equipment and comprehensive emergency response instructions to ensure proper action is taken in the event of an emergency. Although the transporter is responsible for managing and cleaning up any spill incidents, the California Highway Patrol would respond to and provide assistance for any spill incidents which occur on highways or roads in unincorporated portions of the Imperial County. Additionally, the nearest District Fire Station would initially respond to a hazardous material spill incident to provide immediate assistance, with follow-up response provided by the Imperial County Fire Department HAZMAT Team. The potential risk of a public safety hazard resulting from spills of hazardous chemicals being transported to the Project area would be below the level of significance.

Following completion of mining and final reclamation, the East Pit would remain open, and the steep sidewalls of the open pit would result in a continuing potential public safety risk. This public safety risk would be increased if the open pit contained a pit lake, which might attract the public to attempt to enter the pit. However, the Proposed Action includes measures to reduce or eliminate the formation of a pit lake (see Section 2.1.3 and Section 4.1.3.1.2), and states that the open East Pit would be barricaded with large boulders around the rim to prevent vehicular access and discourage pedestrian access by the public over slopes which could constitute a hazard (see Section 2.1.11.2.2). The barricade would consist of boulders averaging approximately four (4) feet in diameter, which

would be stacked into a continuous wall no less than eight (8) feet high. This "wall" would be set back from the edge of the pit by no less than 100 feet. In addition, the uppermost ten (10) feet of the pit slope would slope no greater than 2H:1V (30 degrees), and would terminate at its lower side into a horizontal bench no less than ten (10) feet wide. With this construction, the effects of the Project on public safety from the remnant open pit would be below the level of significance.

Should mining be terminated prior to the complete backfilling of either the West Pit or the Singer Pit, these pits would not be barricaded under the Proposed Action, and no measures would be taken to reduce or eliminate the formation of a pit lake in the West Pit. This would constitute a significant effect on public safety.

4.1.12.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

Although the assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts, these measures are expressly identified below to facilitate review and implementation. Mitigation measures, if any, which are proposed to avoid or reduce potentially significant effects are separately identified.

<u>Measures Incorporated by Project Design Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.12-1: Applicant shall provide appropriate levels of on-site security, fire protection services, and emergency first-aid medical services.
- 4.1.12-2: Applicant shall construct and maintain a fence around the perimeter of the Project mine and process area over the life of the Project, and a chain-link fence, no less than six (6) feet in height, with one (1) foot of barbed wire at the top, around the ore leach pad, process facilities, to prevent the public from accessing these facilities.
- 4.1.12-3: Sodium cyanide shall be shipped to, and received at, the Project mine and process area in solid, briquette from in the manufacturer's dry bulk trucks, and be put into solution directly from the dry bulk trucks at the Project mine and process area process facility.
- 4.1.12-4: Before removal of the perimeter fence at the end of the active life of the Project, Applicant shall construct around the rim of the open East Pit a barricade with large boulders to prevent vehicular access and discourage pedestrian access by the public over slopes which could constitute a hazard. The barricade shall consist of boulders averaging approximately four (4) feet in diameter, which shall be stacked into a continuous wall no less than eight (8) feet high. This "wall" shall be set back from the edge of the pit by no less than 100 feet. In addition, the uppermost ten (10) feet of the pit slope shall slope no greater than 2H:1V (30 degrees), and shall terminate at its lower side into a horizontal bench no less than ten (10) feet wide.

- 4.1.12-5: Applicant shall post no trespassing and hazardous chemical signs, in both English and Spanish, at strategic locations along perimeter locations of the Project mine and process area perimeter fence and the process facilities barbed wire-topped chain-link fence, respectively.

- 4.1.12-6: Applicant shall prepare a hazardous material spill/release contingency plan and provide appropriate training to all Project employees on the proper response to potential chemical releases.

- 4.1.12-7: Applicant shall prepare an emergency response contingency plan which provides for actions to be taken in the event of an injury accident, hazardous materials release, fire, flash flooding on Indian Pass Road, or other emergency situation. The emergency response contingency plan shall include emergency phone numbers and services available for both surface and air transport of injured employees. The emergency contingency response plan shall incorporate protocols acceptable to the BLM, ICPWD, and the Imperial County Sheriff's Office for dealing with flash floods and public safety on Indian Pass Road. The protocols shall address notification of agencies and closures of Indian Pass Road.

<u>Measures Incorporated by Regulation Which Avoid or Reduce Potentially Significant Impacts</u>:

- 4.1.12-8: Applicant shall prepare and maintain a hazardous material business plan in conformance with the requirements of Imperial County.

- 4.1.12-9: Applicant shall conform with all applicable safety regulations required by the Mine Safety and Health Administration (MSHA), Occupational Safety and Health Administration (OSHA), and California Occupational Safety and Health Administration (Cal-OSHA).

<u>Incorporated to Avoid or Reduce Potentially Significant Effects</u>:

See also those measures described in Section 4.1.5.4 designed to eliminate the possibility of a pit lake to mitigate potential impacts to wildlife.

- 4.1.12-10: Before removal of the perimeter fence at the end of the active life of the Project, Applicant shall construct around the rim of the all open pit(s) a barricade with large boulders to prevent vehicular access and discourage pedestrian access by the public over slopes which could constitute a hazard. The barricade shall consist of boulders averaging approximately four (4) feet in diameter, which shall be stacked into a continuous wall no less than eight (8) feet high. This "wall" shall be set back from the edge of the pit by no less than 100 feet. In addition, the uppermost ten (10) feet of the pit slope shall slope no greater than 2H:1V (30 degrees), and shall terminate at its lower side into a horizontal bench no less than ten (10) feet wide.

4.1.12.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would have the unavoidable indirect potential to adversely effect worker and/or public safety through the accidental spill or release of hazardous substances either in transport to the Project area or from activities within the Project area. This unavoidable potential effect is considered less than significant.

The mitigated effects of the Proposed Action on all emergency services and public safety is below the level of significance.

4.1.13. Other Resources

4.1.13.1. Assumptions and Assessment Guidelines

The assessment of impacts assumes the implementation of those measures incorporated into the project design or required by regulation which avoid or reduce potentially significant impacts.

The Proposed Action would normally have a significant effect on the environment if it would:

- Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime or unique agricultural land.
- Result in a substantial adverse impact to a designated wild or scenic river.
- Result in a substantially disproportionate share of the negative environmental impacts of a project on minority populations and low-income populations.

4.1.13.2. Impacts of the Proposed Action

Because neither the Project area nor the overbuilt 92 kV/34.5 kV transmission line corridor is in or adjacent to an area of prime or unique farmland or a designated wild or scenic river, the Proposed Action would have no impacts to either of these resources.

Environmental Justice and Sacred Sites:

Environmental Justice Executive Order: Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) was signed by President Clinton on February 11, 1994 and became effective on that date. This Executive Order required each federal agency to make achieving "environmental justice" part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations in the United States and

its territories and possessions. Agency responsibilities under the Executive Order apply equally to Native American programs.

Relevant to Environmental Justice is the nature of the proposed action and requisite law involved. A mining project such as the Imperial Project allows for limited agency discretion, practically as well as regulatorally (see Section 1.6.1). The location and layout of a mine is a consequence of the nature and formation of mineral ore body. Section 3 of the 1872 Mining Act (30 USC 26) gives exclusive right of "possession and enjoyment" of the surface within the boundaries of a valid mining claim to the mining claimant. The right of the United States to manage surface resources but not locatable minerals on a valid mining claim was also authorized, as long as such management did not materially interfere with the operation of the mining claim (30 USC 612(b)).

Population in the Affected Area: The Project area lies within an unpopulated, unincorporated area of Imperial County. The nearest residence is located at Gold Rock Ranch, a mobile home (21 sites)/RV park (14 sites) located approximately seven (7) miles southwest of the Project mine and process area (see Section 5.2.2.2). No other residences exist within ten (10) miles of the Project mine and process area. The Project mine and process area is ten (10) miles from the closest point of the Ft. Yuma Indian Reservation, and the principal concentrations of housing on the reservation are over sixteen (16) miles away.

Impact: Quechan tribal members expressed concern that construction and operation activities in the Project mine and process area would impact an area of religious, cultural, and educational value, which has been termed the Indian Pass-Running Man ATCC (see Section 3.6.2.4). This area was used as recently as the 1940's for specific religious observances that can only occur in this place, and Quechan tribal members have stated that they plan to conduct such observances at this location in the future. The Indian Pass-Running Man ATCC is viewed as necessary for religious practitioners to gain requisite knowledge for continuation of Quechan religious beliefs and practices, and necessary for teaching Indian youth about tribal history, religion, and culture. Quechan tribal members have stated that the development of the Project pits, heap, and waste rock stockpiles would destroy the ability of the Quechan to perform their religious, cultural and educational practices.

Quechan tribal members have also expressed concern for the cumulative impacts of both recent developments and historic activities on sites of cultural and religious significance (see Section 5.3.4 for a discussion of cumulative impacts to cultural sites and religious values).

The environmental consequences of the Proposed Action (see Section 4.1.1 through Section 4.1.12) will not result in any conditions, such as reduced air quality, noise exposure, or transportation of hazardous or other materials, which could produce a substantial direct or indirect impact to human health or environmental effects to any population residing at the distances identified above from the Project area.

Consultation with Native American Pursuant to Executive Order 12898: The BLM, through the El Centro Resource Area Manager, initiated an extensive consultation process with the Quechan Tribe in 1996 in conformance with NHPA, AIRFA, and the Executive Order 13007 (Sacred Sites). Based upon comments, particularly those by the Quechan Tribe, the November 1996 Draft EIS was withdrawal and a new Draft EIS prepared (see Section 1.5 and Chapter 7). As part of the process to prepare this new Draft EIS, the Quechan were requested to participate in resurveying the area of the Proposed Action, and an extensive effort to document Quechan concerns was initiated through the Tribal Cultural Committee. Particular individuals identified by the Tribal Cultural Committee provided cultural and religious information (see Section 3.6).

4.1.13.3. Measures Incorporated by Project Design and Regulation and Mitigation Measures

No mitigation measures are required.

4.1.13.4. Unavoidable Adverse Effects and Level of Significance After Mitigation

The Proposed Action would have no unavoidable adverse effects on other resources.

4.2. West Pit Alternative

As discussed in Section 2.2.1, the West Pit Alternative would eliminate the East Pit, the East Waste Rock Stockpile, and the East Pit West and East Pit East drainage diversions within the Project mine and process area. The size of the leach pad, the process area, and the haul and maintenance roads would also be reduced. Only 150 million tons of material would be mined. The total surface area of disturbance within the Project mine and process area would be reduced from 1,302 acres under the Proposed Action to approximately 795 acres (see Table 2.6), and the Project life would be decreased from the approximately twenty (20) years under the Proposed Action to about ten (10) years under the West Pit Alternative. Under the West Pit Alternative, the Singer Pit would not be backfilled, and the West Pit would only be partially backfilled with waste rock from the Singer Pit. Both the South Waste Rock Stockpile and the heap would be constructed to a height of approximately 300 feet, the same height as under the Proposed Action. All environmental protection measures and reclamation activities would be conducted as under the Proposed Action.

4.2.1. Geology and Mineral Resources

4.2.1.1. Impacts of the West Pit Alternative

The West Pit Alternative would leave the precious metal resources in the East Pit area unmined and undeveloped. Because the West Pit would only be partially backfilled, any residual potential mineral resources remaining in the West Pit would be more available to be developed in the future than were the pit to be completely backfilled. Neither of these differences create a significant environmental effect. Other than these, there would be no substantive difference in the impacts of the West Pit

Alternative on geology and mineral resources from those identified for the Proposed Action (see Section 4.1.1.2). The effects of the West Pit Alternative on geology and mineral resources would be below the levels of significance.

4.2.1.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on geology and mineral resources would be the same as those identified for the Proposed Action (see Section 4.1.1.3). No other measures would be necessary to reduce impacts of the West Pit Alternative below the level of significance. The effects of the West Pit Alternative on geology and mineral resources would remain below the level of significance.

4.2.2. Soil Resources

4.2.2.1. Impacts of the West Pit Alternative

The West Pit Alternative would decrease the total area of surface disturbance from the 1,362 acres under the Proposed Action to 853 acres, an approximate 37 percent reduction. This would translate to an approximate 37 percent reduction in the loss of soil resources (see Section 4.1.2.2). Other potential impacts, such as erosion within the West Pit Alternative project mine and process area, would be the same in effect, although slightly reduced in magnitude, as those identified for the Proposed Action in Section 4.1.2.2. There would be a two (2) acre (six [6] percent) reduction in the acreage of soils disturbed in the West Pit Alternative project ancillary area because only two (2) ground water wells would be drilled, but no change in the overbuilt 92 kV/34.5 kV transmission line corridor. The effects of the West Pit Alternative on soil resources would also be below the levels of significance.

4.2.2.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on soil resources would be the same as those identified for the Proposed Action (see Section 4.1.2.3). No other measures would be necessary to reduce impacts of the West Pit Alternative below the level of significance. The effects of the West Pit Alternative on soil resources would remain below the level of significance.

4.2.3. Hydrologic Resources

4.2.3.1. Impacts of the West Pit Alternative

Surface Water

The West Pit Alternative would eliminate the need to construct the East Pit West and East Pit East diversion channels, and would eliminate any impact to these existing surface drainage channels. The remaining impacts to surface water diversions would not be significant. The East Pit would not be mined, the East Waste Rock Stockpile would not be built, and the heap would be reduced in size, so there would be less precipitation contained within the West Pit Alternative project mine and process area and not discharged into surface runoff. The impact to sediment production of the facilities constructed under the West Pit Alternative would be less than significant. Since the East Pit would not be mined, the potential for seeps or a pit lake in the East Pit would be completely eliminated. However, since the West Pit would not be completely backfilled under the West Pit Alternative, and the West Pit is projected to be mined to a depth below the existing ground water level, seeps, and possibly (but not likely) a pit lake, could form in the West Pit. Since the Singer Pit would not be mined below the elevation of the ground water table, no pit lake could form from ground water inflows as a result of not backfilling the Singer Pit. The impacts of the West Pit Alternative from ground water inflows would be below the level of significance. The West Pit Alternative would also result in a reduction of 29 percent, to 55.2 acres (LSA 1997b), in the area of "waters of the United States" which would be dredged or filled over the Proposed Action. This impact would also be below the level of significance (see Section 4.1.3.1.2).

Ground Waters

The West Pit Alternative would produce ground water for operations at a rate somewhat less than that under the Proposed Action, and from a maximum of only two (2) ground water wells. Also, since the West Pit Alternative would have an estimated life of only half that of the Proposed Action, the total amount of water produced would be substantially less than half of that produced under the Proposed Action. However, because most of the ground water table drawdown occurs early in the ground water production process, the ground water table drawdown in the area surrounding the ground water production wells would be only slightly reduced from the Proposed Action. Recovery to pre-project levels would be substantially earlier, however, because pumping would cease sooner. Neither impact would be above the level of significance. The effects of the West Pit Alternative on ground water quality and pit water quality would not be different than that of the Proposed Action, although the likelihood of any impacts to ground water quality or pit water quality would be further reduced because of the reduction in size of the heap pad and the elimination of the East Pit (see Section 4.1.3.2.2).

4.2.3.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on surface water and ground water resources would be the same as those identified for the Proposed Action (see Section 4.1.3.1.3 and Section 4.1.3.2.3). No other measures would be necessary to reduce impacts of the West Pit Alternative below the level of significance. The effects of the West Pit Alternative on surface water and ground water resources would remain below the level of significance.

4.2.4. Air Resources

4.2.4.1. Impacts of the West Pit Alternative

The impacts of the West Pit Alternative on air resources would be very similar to, but slightly reduced from, the impacts to air resources which would result from the implementation of the Proposed Action. The biggest difference would be that the impacts from the West Pit Alternative would be reduced in duration to only ten (10) years from twenty (20) years under the Proposed Action (see Section 4.1.4.2). The effects of the West Pit Alternative on air resources would be below the level of significance except for PM_{10}. Although the effects of the West Pit Alternative would be mitigated to below the level of significance, the West Pit Alternative would still contribute to exceedences of the 24-hour CAAQS for PM_{10} which may continue to occur in the future during periods of high wind. This would be a cumulatively significant effect.

4.2.4.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on air resources would be the same as those identified for the Proposed Action (see Section 4.1.4.3). No other measures are proposed to reduce impacts of the West Pit Alternative below the level of significance. The effects of the West Pit Alternative on air resources would remain below the level of significance except for PM_{10}. Although the effects of the West Pit Alternative would be mitigated to below the level of significance, the West Pit Alternative would still contribute to exceedences of the 24-hour CAAQS for PM_{10} which may continue to occur in the future during periods of high wind. This would remain a cumulatively significant effect.

4.2.5. Biological Resources

4.2.5.1. Impacts of the West Pit Alternative

Vegetation and Plant Habitat

The West Pit Alternative would reduce the total surface disturbance from 1,362 acres under the Proposed Action to 853 acres, a reduction of 37 percent. The loss of shrub/scrub vegetation habitat would be reduced from approximately 1,260 acres under the Proposed Action to approximately 719 acres, and the loss of shrub/tree vegetation habitat would be reduced from approximately 87 acres under the Proposed Action to approximately 52 acres. In addition, the amount of surface area not reclaimed (the West Pit slopes not covered by backfill) would decrease from 165 acres under the Proposed Action to approximately 88 acres, a reduction of 47 percent. The time required to complete final reclamation would also be reduced to approximately ten (10) years.

Although the magnitude of the impacts to vegetation and plant habitat from this reduced surface disturbance would be reduced by 37 percent, the impacts themselves would be the same as the Proposed Action, and would remain below the level of significance. Other impacts to vegetation and plant habitat (from dust, ground water pumping, surface channel diversions, and sensitive plants) would also be reduced proportionately from those of the Proposed Action (see Section 4.1.5.2), and would remain below the level of significance.

Wildlife, Wildlife Habitat and Wildlife Movement

The reduced area of surface disturbance resulting from the West Pit Alternative would also reduce the amount of wildlife habitat lost over that of the Proposed Action. Approximately 719 acres of desert succulent scrub habitat and 52 acres of microphyll woodland habitat would be lost. Approximately 152 acres of the 947-acre West Pit Alternative project mine and process area would be undisturbed. Most of this habitat loss would be temporarily, until the completion of final reclamation (and subsequent vegetation recovery). However, approximately one-half (½) of the disturbed microphyll woodland habitat would be reclaimed not as microphyll woodland habitat but as desert succulent scrub habitat, and the 88 acres of the West Pit slopes would not be reclaimed.

Although the magnitude of the impacts to wildlife and wildlife habitat from this reduced surface disturbance would be reduced by 37 percent, the impacts themselves would be the same as the Proposed Action, and would remain below the level of significance. Other impacts from the West Pit Alternative on wildlife and wildlife habitat (from ground water pumping, surface channel diversions, and sedimentation) would also be reduced proportionately from those of the Proposed Action (Section 4.1.5.3), and would remain below the level of significance.

The West Pit Alternative would mine and leave open or partially open the 33-acre Singer Pit and the 110-acre West Pit. This would reduce the potential area over which wildlife could be killed or injured by falls or opportunistic predators from the 198-acres left open under the Proposed Action. This impact would be below the level of significance.

The West Pit Alternative would have a life of only approximately ten (10) years, which would reduce the exposure of wildlife and wildlife habitat to impacts from vehicles, hazardous materials, noise, human presence, etc., by about one-half (½) over the Proposed Action. These effects would be below the level of significance.

Although reduced from the Proposed Action, the impacts of the West Pit Alternative on the desert tortoise would remain above the level of significance.

4.2.5.2. Mitigation Measures

Measures to reduce the effects of the West Pit Alternative on biological resources would be the same as those measures identified for the Proposed Action (see Section 4.1.5.4), except as altered to reflect the reduction in area or time from the Proposed Action. With implementation of the identified measures, the mitigated effects of the West Pit Alternative on biological resources would be below the level of significance.

4.2.6. Cultural and Paleontological Resources

4.2.6.1. Impacts of the West Pit Alternative

The West Pit Alternative would create approximately 38 percent less surface disturbance than the Proposed Action within the Project area, and identical surface disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor. However, the density of cultural resource features determined eligible for the NRHP and identified within the Project mine and process area is substantially higher on the west side, in the area of the West Pit and South Waste Rock Stockpile, than on the east side, in the area of the East Pit and the heap leach pad and process facilities. Consequently, the impacts of the West Pit Alternative on cultural resources determined eligible for the NRHP appear to be only slightly less than the impacts to these same type of cultural resources which would result from the implementation of the Proposed Action. The impacts of the West Pit Alternative would remain above the level of significance. The West Pit Alternative would do little to reduce the adverse effects on the Indian Pass-Running Man ATCC, and remaining impacts would be above the level of significance. The effects of the West Pit Alternative on those cultural resources identified within the overbuilt 92 kV/34.5 kV transmission line corridor would be identical to the Proposed Action, and above the level of significance.

4.2.6.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on cultural resources would be the same as those identified for the Proposed Action (see Section 4.1.6.3). Measures to reduce the significant effects of the West Pit Alternative on cultural resource features identified within the overbuilt 92 kV/34.5 kV transmission line corridor, or within the West Pit Alternative project area, which

were determined eligible for the NRHP under criterion "D" would be identical to those identified for the Proposed Action. The mitigated impacts would be reduced below the level of significance. Measures to reduce the significant effects of the West Pit Alternative on cultural resource features determined eligible for the NRHP under criteria "A", "B," or "C" which were identified within the West Pit Alternative project area, or to reduce the significant effects of the West Pit Alternative on the Indian Pass-Running Man ATCC, would be identical to those identified for the Proposed Action. The mitigated effects of these impacts would remain above the level of significance and be unavoidable.

4.2.7. Visual Resources

4.2.7.1. Impacts of the West Pit Alternative

The West Pit Alternative would result in visual contrasts created by changes in line and form from the creation of new structures and facilities, altered surface colors, textures and vegetation cover, and changes in topography similar to the Proposed Action (see Section 4.1.7.2). Because of the smaller area of surface disturbance, the elimination of one waste rock stockpile, and the smaller size (but not height) of the remaining waste rock stockpile and heap, the magnitude of these effects would be reduced from some viewpoints, but not from others. The view of the West Pit Alternative project mine and process area from KOP #1 and KOP #4 would be very similar to the view of the Proposed Action from these same points (see Figure 4.3 and Figure 4.9, respectively) since the view of the West Pit Alternative is principally of the upper portions of the south ends of the South Waste Rock Stockpile and the heap, which change very little from the Proposed Action. The view of the West Pit Alternative project mine and process area from KOP #2 and KOP #3 (see Figure 4.5 and Figure 4.7, respectively) would show the reduced surface disturbance and the elimination or reduction of each of the features within the West Pit Alternative project mine and process area over the Proposed Action. However, the effects of the West Pit Alternative on line and form would remain, like the Proposed Action, above the level of significance. Impacts to visual resources from the West Pit Alternative from the lighting of mine and process areas and visibility reduction would remain essentially identical to the Proposed Action (see Section 4.1.7.2), except that they would be shorter in duration by about ten (10) years. Like the Proposed Action, the impacts of visibility reduction would be below the level of significance, while the impacts of lighting would be above the level of significance.

4.2.7.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design which eliminate potentially significant effects on visual resources would be the same as those identified for the Proposed Action (see Section 4.1.7.3). Measures to reduce the significant effects of the West Pit Alternative on lighting would also be the same as those measures identified for the Proposed Action. With implementation of the identified measures, the mitigated effects of the West Pit Alternative on visual resources from visibility reduction and lighting would be below the level of significance. The

mitigated effects of the West Pit Alternative on visual resources from changes in line and form would remain above the level of significance.

4.2.8. Noise

4.2.8.1. Impacts of the West Pit Alternative

The noise generated by the West Pit Alternative would be essentially identical to the noise generated by the Proposed Action, except that the noise would cease earlier. The impacts of the generated noise on receptors would also be essentially the same as that described for the Proposed Action (see Section 4.1.8.2), except that the impacts would also cease earlier. The noise impacts of the West Pit Alternative would be below the levels of significance.

4.2.8.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects of noise would be the same as those identified for the Proposed Action (see Section 4.1.8.3). No other measures would be necessary to reduce impacts of the West Pit Alternative below the level of significance. The noise effects of the West Pit Alternative would remain below the level of significance.

4.2.9. Land Use

4.2.9.1. Impacts of the West Pit Alternative

The compatibility of the West Pit Alternative with existing land uses and adopted land use policies and plans would be essentially identical to that of the Proposed Action (see Section 4.1.9.2). Blasting during mining operations could be a significant potential hazard to low-flying military aircraft using the general area for training exercises (although this impact would end in approximately ten (10), rather than twenty (20), years). The West Pit Alternative's impact on recreational use of the area, including wilderness use, would be essentially identical in type, but slightly reduced in scale and duration, from that of the Proposed Action, since the West Pit Alternative would exclude recreational use only over 947 acres for approximately ten (10) years instead of 1,571 acres for approximately twenty (20) years. These impacts would be below the level of significance.

4.2.9.2. Mitigation Measures

Measures to ensure the compatibility of the West Pit Alternative with existing land uses, adopted land use policies and plans, and recreational use of the area would be the same as those measures identified for the Proposed Action (see Section 4.1.9.2). With implementation of the identified measures, the mitigated level of compatibility of the West Pit Alternative with existing land uses,

adopted land use policies and plans, and recreational use of the area, would be below the level of significance.

4.2.10. Socioeconomics

4.2.10.1. Impacts of the West Pit Alternative

The West Pit Alternative would have a net beneficial socioeconomic effect which would be reduced from the net beneficial socioeconomic effect of the Proposed Action (see Section 4.1.10.2). These effects would be below the level of significance. Although the number of jobs created under the West Pit Alternative would be approximately the same as the Proposed Action, the length of these jobs would be decreased from approximately twenty (20) years to ten (10) years. Initial capital expenditures for (and thus sales taxes paid under) the West Pit Alternative would be approximately the same as the Proposed Action. Recurrent, annual expenditures (such as annual capital expenditures of approximately $1.7 million (and $0.13 million in sales taxes), non-capital expenditures of approximately $26 million, and property taxes of between $200,000 and $600,000) would be reduced by one-half (½) from that of the Proposed Action because of the decreased operating life.

4.2.10.2. Mitigation Measures

No mitigation measures are proposed or recommended.

4.2.11. Roads and Public Services

4.2.11.1. Impacts of the West Pit Alternative

The West Pit Alternative would result in an essentially identical increase in traffic as the Proposed Action (see Section 4.1.11.1.2), except that the effects would occur for only ten (10), rather than twenty (20), years. These effects would be below the level of significance. The West Pit Alternative would require the realignment of Indian Pass Road to the identical degree and timing as the Proposed Action. These impacts would also be below the level of significance. The West Pit Alternative would also create a potential impact from "spur" roads, to a similar extent and degree as the Proposed Action. This impact would be below the level of significance.

The West Pit Alternative would have a similar impact on utilities as the Proposed Action. Because of the reduced size of the project, less non-mining waste would be generated (see Section 4.1.11.1.2). All impacts on utilities would be below the level of significance. The West Pit Alternative would also produce impacts on public services similar to the Proposed Action (see Section 4.1.11.3.2). Because of the reduced surface area to be disturbed, there would be fewer cadastral monuments which may be destroyed. These impacts would be below the level of significance.

4.2.11.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on roads, utilities and public services would be the same as those measures identified for the Proposed Action (see Section 4.1.11.1.3, Section 4.1.11.2.3, and Section 4.1.11.3.3). No other measures would be necessary to reduce impacts of the West Pit Alternative below the level of significance. The effects of the West Pit Alternative on roads, utilities and public services would remain below the level of significance.

4.2.12. Emergency Services and Public Safety

4.2.12.1. Impacts of the West Pit Alternative

The West Pit Alternative would have essentially identical impacts on emergency services and public safety as would the Proposed Action (see Section 4.1.12.2), although the life of the West Pit Alternative would be ten (10), rather than twenty (20), years. Instead of the East Pit being left open following the completion of mining and reclamation, under the West Pit Alternative the Singer Pit and the West Pit would be left open. The effects of the West Pit Alternative on emergency services and public safety would be less than significant.

4.2.12.2. Mitigation Measures

Mitigation measures incorporated into the West Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on emergency services and public safety would be the same as those measures identified for the Proposed Action (see Section 4.1.12.3). No other measures would be necessary to reduce impacts of the West Pit Alternative below the level of significance. The effects of the West Pit Alternative on emergency services and public safety would be below the level of significance.

4.2.13. Other Resources

4.2.13.1. Impacts of the West Pit Alternative

The West Pit Alternative would have essentially identical impacts on other resources as would the Proposed Action (see Section 4.1.13), although the life of the West Pit Alternative would be ten (10), rather than twenty (20), years. The effects of the West Pit Alternative on other resources would be less than significant.

4.2.13.2. Mitigation Measures

No mitigation measures are proposed or recommended.

4.3. East Pit Alternative

As discussed in Section 2.2.2, the East Pit Alternative would eliminate the West Pit, the West Soil Stockpile, the West Pit West and West Pit East drainage diversions, and the relocation of Indian Pass Road within the Project mine and process area. The size of the leach pad, the South Waste Rock Stockpile, the associated areas of disturbance, and the haul and maintenance roads would also be reduced. Only 300 million tons of material would be mined. The total surface area of disturbance within the Project mine and process area would be reduced from 1,302 acres under the Proposed Action to approximately 1,126 acres (see Table 2.7), and the Project life would be decreased from the approximately twenty (20) years under the Proposed Action to about fourteen (14) years under the East Pit Alternative. Under the East Pit Alternative, the Singer Pit would be completely backfilled, and the East Pit would not be backfilled. The South Waste Rock Stockpile and the East Waste Rock Stockpile would still be constructed to approximately the same height (300 feet) as under the Proposed Action, but the heap would be constructed to a height of approximately 250 feet.

4.3.1. Geology and Mineral Resources

4.3.1.1. Impacts of the East Pit Alternative

The East Pit Alternative would leave the precious metal resources in the West Pit area unmined and undeveloped. This would not be a significant environmental effect. Other than this, there would be no substantive difference in the impacts of the East Pit Alternative on geology and mineral resources from those identified for the Proposed Action (see Section 4.1.1.2). The effects of the East Pit Alternative on geology and mineral resources would be below the levels of significance.

4.3.1.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on geology and mineral resources would be the same as those identified for the Proposed Action (see Section 4.1.1.3). No other measures would be necessary to reduce impacts of the East Pit Alternative below the level of significance. The effects of the East Pit Alternative on geology and mineral resources would remain below the level of significance.

4.3.2. Soil Resources

4.3.2.1. Impacts of the East Pit Alternative

The East Pit Alternative would decrease the total area of surface disturbance from the 1,362 acres under the Proposed Action to 1,126 acres, an approximate 19 percent reduction. This would translate to an approximate 19 percent reduction in the loss of soil resources (see Section 4.1.2.2). Other potential impacts, such as erosion within the East Pit Alternative project mine and process area,

would be the same in effect, although slightly reduced in magnitude, as those identified for the Proposed Action in Section 4.1.2.2. There would be a seven (7) acre (eighteen [18] percent) reduction in the acreage of soils disturbed in the East Pit Alternative project ancillary area because only three (3) ground water wells would be drilled and Indian Pass Road would not be relocated. There would be no change in the overbuilt 92 kV/34.5 kV transmission line corridor. The effects of the East Pit Alternative on soil resources would also be below the levels of significance.

4.3.2.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on soil resources would be the same as those identified for the Proposed Action (see Section 4.1.2.3). No other measures would be necessary to reduce impacts of the East Pit Alternative below the level of significance. The effects of the East Pit Alternative on soil resources would remain below the level of significance.

4.3.3. Hydrologic Resources

4.3.3.1. Impacts of the East Pit Alternative

<u>Surface Water</u>

The East Pit Alternative would eliminate the need to construct the West Pit West and West Pit East diversion channels, and would eliminate any impact to these existing surface drainage channels. The remaining impacts to surface water diversions would not be significant. The West Pit would not be mined, the West Soil Stockpile would not be built, and the heap would be slightly reduced in size, so there would be slightly less precipitation contained within the East Pit Alternative project mine and process area and not discharged into surface runoff. The impact to sediment production of the facilities constructed under the East Pit Alternative would be less than significant. The impacts of the East Pit Alternative from ground water inflows would be below the level of significance. The East Pit Alternative would also result in a reduction of 17 percent, to 64.4 acres (LSA 1997b), in the area of "waters of the United States" which would be dredged or filled over the Proposed Action. This impact would also be below the level of significance (see Section 4.1.3.1.2).

<u>Ground Waters</u>

The East Pit Alternative would produce ground water for operations at a rate slightly less than that under the Proposed Action, and from a maximum of three (3) ground water wells. Also, since the East Pit Alternative would have an estimated life of approximately two-thirds (⅔) that of the Proposed Action, the total amount of water produced would be less than two-thirds (⅔) that produced under the Proposed Action. However, because most of the ground water table drawdown occurs early in the ground water production process, the ground water table drawdown in the area surrounding the ground water production wells would be only slightly reduced from the Proposed

Action. Recovery to pre-project levels would be earlier, however, because pumping would cease sooner. Neither impact would be above the level of significance. The effects of the East Pit Alternative on ground water quality and pit water quality would not be different than that of the Proposed Action, although the likelihood of any impacts to ground water quality or pit water quality would be slightly reduced because of the reduction in size of the heap pad and the elimination of the West Pit (see Section 4.1.3.2.2).

4.3.3.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on surface water and ground water resources would be the same as those identified for the Proposed Action (see Section 4.1.3.1.3 and Section 4.1.3.2.3). No other measures would be necessary to reduce impacts of the East Pit Alternative below the level of significance. The effects of the East Pit Alternative on surface water and ground water resources would remain below the level of significance.

4.3.4. Air Resources

4.3.4.1. Impacts of the East Pit Alternative

The impacts of the East Pit Alternative on air resources would be very similar to, but slightly reduced from, the impacts to air resources which would result from the implementation of the Proposed Action. The biggest difference would be that the impacts from the East Pit Alternative would be reduced in duration to only fourteen (14) years from twenty (20) years under the Proposed Action (see Section 4.1.4.2). The effects of the East Pit Alternative on air resources would be below the level of significance except for PM_{10}. Although the effects of the East Pit Alternative would be mitigated to below the level of significance, the East Pit Alternative would still contribute to exceedences of the 24-hour CAAQS for PM_{10} which may continue to occur in the future during periods of high wind. This would be a cumulatively significant effect.

4.3.4.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on air resources would be the same as those identified for the Proposed Action (see Section 4.1.4.3). No other measures are proposed to reduce impacts of the East Pit Alternative below the level of significance. The effects of the East Pit Alternative on air resources would remain below the level of significance except for PM_{10}. Although the effects of the East Pit Alternative would be mitigated to below the level of significance, the East Pit Alternative would still contribute to exceedences of the 24-hour CAAQS for PM_{10} which may continue to occur in the future during periods of high wind. This would remain a cumulatively significant effect.

4.3.5. Biological Resources

4.3.5.1. Impacts of the East Pit Alternative

Vegetation and Plant Habitat

The East Pit Alternative would reduce the total surface disturbance from 1,362 acres under the Proposed Action to 1,126 acres, a reduction of 19 percent. The loss of shrub/scrub vegetation habitat would be reduced from approximately 1,260 acres under the Proposed Action to approximately 1,064 acres, and the loss of shrub/tree vegetation habitat would be reduced from approximately 87 acres under the Proposed Action to approximately 62 acres. The amount of surface area not reclaimed (the East Pit slopes not covered by backfill) would remain unchanged from the Proposed Action at 165 acres. The time required to complete final reclamation would also be reduced to approximately fourteen (14) years.

Although the magnitude of the impacts to vegetation and plant habitat from this reduced surface disturbance would be reduced by 19 percent, the impacts themselves would be the same as the Proposed Action, and would remain below the level of significance. Other impacts to vegetation and plant habitat (from dust, ground water pumping, surface channel diversions, and sensitive plants) would also be reduced proportionately from those of the Proposed Action (see Section 4.1.5.2), and would remain below the level of significance.

Wildlife, Wildlife Habitat and Wildlife Movement

The reduced area of surface disturbance resulting from the East Pit Alternative would also reduce the amount of wildlife habitat lost over that of the Proposed Action. Approximately 1,064 acres of desert succulent scrub habitat and 62 acres of microphyll woodland habitat would be lost. Approximately 203 acres of the 1,276-acre East Pit Alternative project mine and process area would be undisturbed. Most of this habitat loss would be temporarily, until the completion of final reclamation (and subsequent vegetation recovery). However, approximately one-half (½) of the disturbed microphyll woodland habitat would be reclaimed not as microphyll woodland habitat but as desert succulent scrub habitat, and the 165 acres of the East Pit slopes would not be reclaimed.

Although the magnitude of the impacts to wildlife and wildlife habitat from this reduced surface disturbance would be reduced by approximately 19 percent, the impacts themselves would be the same as the Proposed Action, and would remain below the level of significance. Other impacts from the East Pit Alternative on wildlife and wildlife habitat (from ground water pumping, surface channel diversions, and sedimentation) would also be reduced proportionately from those of the Proposed Action (see Section 4.1.5.3), and would remain below the level of significance.

The East Pit Alternative would mine and leave open the 198-acre East Pit, which is the same potential area over which wildlife could be killed or injured by falls or opportunistic predators as the Proposed Action. This impact would be below the level of significance.

The East Pit Alternative would have a life of approximately fourteen (14) years, which would reduce the exposure of wildlife and wildlife habitat to impacts from vehicles, hazardous materials, noise, human presence, etc., by about one-third (⅓) over the Proposed Action. These effects would be below the level of significance.

Although slightly reduced from the Proposed Action, the impacts of the East Pit Alternative on the desert tortoise would remain above the level of significance.

4.3.5.2. Mitigation Measures

Measures to reduce the effects of the East Pit Alternative on biological resources would be the same as those measures identified for the Proposed Action (see Section 4.1.5.4), except as altered to reflect the reduction in area or time from the Proposed Action. With implementation of the identified measures, the mitigated effects of the East Pit Alternative on biological resources would be below the level of significance.

4.3.6. Cultural and Paleontological Resources

4.3.6.1. Impacts of the East Pit Alternative

The East Pit Alternative would create approximately nineteen (19) percent less surface disturbance than the Proposed Action within the Project area, and identical surface disturbance within the overbuilt 92 kV/34.5 kV transmission line corridor. The density of cultural resource features determined eligible for the NRHP and identified within the Project mine and process area is substantially higher on the west side, and specifically in the area of the West Pit, than on the east side, in the area of the East Pit and the heap leach pad and process facilities. Thus, the impacts of the East Pit Alternative on cultural resources determined eligible for the NRHP appear to be substantially less than the nineteen (19) percent reduction in surface disturbance from the Proposed Action would imply. Although these impacts of the East Pit Alternative on cultural resources determined eligible for the NRHP are substantially reduced, the remaining effects would remain above the level of significance.

The East Pit Alternative would reduce the adverse effects on the Indian Pass-Running Man ATCC and the Native American trail system through Indian Pass. Nonetheless, remaining impacts would be above the level of significance. The effects of the East Pit Alternative on those cultural resources identified within the overbuilt 92 kV/34.5 kV transmission line corridor would be identical to the Proposed Action, and above the level of significance.

4.3.6.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on cultural resources would be the same as those identified for the Proposed Action (see Section 4.1.6.3). Measures to reduce the significant effects of the East Pit Alternative on cultural resource features identified within the overbuilt 92 kV/34.5 kV transmission line corridor, or within the East Pit Alternative project area, which were determined eligible for the NRHP under criterion "D" would be identical to those identified for the Proposed Action. The mitigated impacts would be reduced below the level of significance. Measures to reduce the significant effects of the East Pit Alternative on cultural resource features determined eligible for the NRHP under criteria "A", "B," or "C" which were identified within the East Pit Alternative project area, or to reduce the significant effects of the East Pit Alternative on the Indian Pass-Running Man ATCC, would be identical to those identified for the Proposed Action. The mitigated effects of these impacts would remain above the level of significance and be unavoidable.

4.3.7. Visual Resources

4.3.7.1. Impacts of the East Pit Alternative

The East Pit Alternative would result in visual contrasts created by changes in line and form from the creation of new structures and facilities, altered surface colors, textures and vegetation cover, and changes in topography similar to the Proposed Action (see Section 4.1.7.2). Because of the slightly smaller area of surface disturbance, the smaller size of the South Waste Rock Stockpile, and the slightly smaller height of the heap, the magnitude of these effects would be slightly reduced from most viewpoints. The view of the East Pit Alternative project mine and process area from KOP #1 and KOP #4 would be very similar to the view of the Proposed Action from these same points (see Figure 4.3 and Figure 4.9, respectively) since the view of the East Pit Alternative from these points is principally of the upper portions of the south ends of the South Waste Rock Stockpile and the heap, which change little from the Proposed Action. The view of the East Pit Alternative project mine and process area from KOP #2 and KOP #3 (see Figure 4.5 and Figure 4.7, respectively) would show the slightly reduced surface disturbance and the elimination of the West Pit, West Pit West diversion channel, and Indian Pass Road from within the East Pit Alternative project mine and process area and ancillary area over the Proposed Action. However, the effects of the East Pit Alternative on line and form would remain, like the Proposed Action, above the level of significance.

Impacts to visual resources from the East Pit Alternative from the lighting of mine and process areas and visibility reduction would remain essentially identical to the Proposed Action (see Section 4.1.7.2), except that they would be shorter in duration by about fourteen (14) years. Like the Proposed Action, the impacts of visibility reduction would be below the level of significance, while the impacts of lighting would be above the level of significance.

4.3.7.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design which eliminate potentially significant effects on visual resources would be the same as those identified for the Proposed Action (see Section 4.1.7.3). Measures to reduce the significant effects of the East Pit Alternative on lighting would also be the same as those measures identified for the Proposed Action. With implementation of the identified measures, the mitigated effects of the East Pit Alternative on visual resources from visibility reduction and lighting would be below the level of significance. The mitigated effects of the East Pit Alternative on visual resources from changes in line and form would remain above the level of significance.

4.3.8. Noise

4.3.8.1. Impacts of the East Pit Alternative

The noise generated by the East Pit Alternative would be essentially identical to the noise generated by the Proposed Action, except that the noise would cease earlier. The impacts of the generated noise on receptors would also be essentially the same as that described for the Proposed Action (see Section 4.1.8.2), except that the impacts would also cease earlier. The noise impacts of the East Pit Alternative would be below the levels of significance.

4.3.8.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects of noise would be the same as those identified for the Proposed Action (see Section 4.1.8.3). No other measures would be necessary to reduce impacts of the East Pit Alternative below the level of significance. The noise effects of the East Pit Alternative would remain below the level of significance.

4.3.9. Land Use

4.3.9.1. Impacts of the East Pit Alternative

The compatibility of the East Pit Alternative with existing land uses and adopted land use policies and plans would be essentially identical to that of the Proposed Action (see Section 4.1.9.2). Blasting during mining operations could be a significant potential hazard to low-flying military aircraft using the general area for training exercises (although this impact would end in approximately fourteen (14), rather than twenty (20), years). The East Pit Alternative's impact on recreational use of the area, including wilderness use, would be essentially identical in type, but slightly reduced in scale and duration, from that of the Proposed Action, since the East Pit Alternative would exclude recreational use over 1,276 acres for approximately fourteen (14) years instead of 1,571 acres for approximately twenty (20) years. These impacts would be below the level of significance.

4.3.9.2. Mitigation Measures

Measures to ensure the compatibility of the East Pit Alternative with existing land uses, adopted land use policies and plans, and recreational use of the area would be the same as those measures identified for the Proposed Action (see Section 4.1.9.2). With implementation of the identified measures, the mitigated level of compatibility of the East Pit Alternative with existing land uses, adopted land use policies and plans, and recreational use of the area, would be below the level of significance.

4.3.10. Socioeconomics

4.3.10.1. Impacts of the East Pit Alternative

The East Pit Alternative would have a net beneficial socioeconomic effect which would be reduced from the net beneficial socioeconomic effect of the Proposed Action (see Section 4.1.10.2). These effects would be below the level of significance. Although the number of jobs created under the East Pit Alternative would be approximately the same as the Proposed Action, the length of these jobs would be decreased from approximately twenty (20) years to approximately fourteen (14) years. Initial capital expenditures for (and thus sales taxes paid under) the East Pit Alternative would be approximately the same as the Proposed Action. Recurrent, annual expenditures (such as annual capital expenditures of approximately $1.7 million (and $0.13 million in sales taxes), non-capital expenditures of approximately $26 million, and property taxes of between $200,000 and $600,000) would be reduced by approximately one-third (⅓) from that of the Proposed Action because of the decreased operating life.

4.3.10.2. Mitigation Measures

No mitigation measures are proposed or recommended.

4.3.11. Roads and Public Services

4.3.11.1. Impacts of the East Pit Alternative

The East Pit Alternative would result in an essentially identical increase in traffic as the Proposed Action (see Section 4.1.11.1.2), except that the effects would occur for only fourteen (14), rather than twenty (20), years. These effects would be below the level of significance. The East Pit Alternative would not require the realignment of Indian Pass Road, which would eliminate an impact otherwise judged below the level of significance. The East Pit Alternative would also create the potential for impacts from "spur" roads, which would be below the level of significance.

The East Pit Alternative would have a similar impact on utilities as the Proposed Action. Because of the reduced size of the project, less non-mining waste would be generated (see Section 4.1.11.1.2).

All impacts on utilities would be below the level of significance. The East Pit Alternative would also produce impacts on public services similar to the Proposed Action (see Section 4.1.11.3.2). Because of the slightly reduced surface area to be disturbed, there would likely be fewer cadastral monuments which may be destroyed. These impacts would be below the level of significance.

4.3.11.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on roads, utilities and public services would be the same as those measures identified for the Proposed Action (see Section 4.1.11.1.3, Section 4.1.11.2.3, and Section 4.1.11.3.3). No other measures would be necessary to reduce impacts of the East Pit Alternative below the level of significance. The effects of the East Pit Alternative on roads, utilities and public services would remain below the level of significance.

4.3.12. Emergency Services and Public Safety

4.3.12.1. Impacts of the East Pit Alternative

The East Pit Alternative would have essentially identical impacts on emergency services and public safety as would the Proposed Action (see Section 4.1.12.2), although the life of the East Pit Alternative would be fourteen (14), rather than twenty (20), years. The effects of the East Pit Alternative on emergency services and public safety would be less than significant.

4.3.12.2. Mitigation Measures

Mitigation measures incorporated into the East Pit Alternative design and incorporated by regulation which eliminate potentially significant effects on emergency services and public safety would be the same as those measures identified for the Proposed Action (see Section 4.1.12.3). No other measures would be necessary to reduce impacts of the East Pit Alternative below the level of significance. The effects of the East Pit Alternative on emergency services and public safety would be below the level of significance.

4.3.13. Other Resources

4.3.13.1. Impacts of the East Pit Alternative

The East Pit Alternative would have essentially identical impacts on other resources as would the Proposed Action (see Section 4.1.13), although the life of the East Pit Alternative would be fourteen (14), rather than twenty (20), years. The effects of the East Pit Alternative on other resources would be less than significant.

4.3.13.2. Mitigation Measures

No mitigation measures are proposed or recommended.

4.4. Complete Pit Backfill Alternative

The Complete Pit Backfill Alternative would result in the complete backfilling of all open pits, at least to original grade, concurrent with final reclamation (see Section 2.2.3). It would consist of first implementing the Proposed Action, then backfilling the East Pit with mined waste rock material, which would be loaded back into haul trucks, driven to the edge of the East Pit, and dumped into the pit until it is full. The Complete Pit Backfill Alternative would use all of the waste rock available to completely backfill all the mined pits, and leave all of the heaped ore on the leach pad.

The Complete Pit Backfill Alternative would not result in any reduction of the surface disturbance compared to the Proposed Action since the Complete Pit Backfill Alternative begins with the implementation of the Proposed Action. However, a substantial amount of the surface area disturbed by waste rock stockpiles and the East Pit would be reclaimed "at grade" because all the material in the waste rock stockpiles would be moved and dumped into the open East Pit. It would take approximately 4.33 years (4 years, 4 months) beyond the end of mining to move enough waste rock back into the East Pit to fill it to grade, although this would likely be accomplished during the twenty (20)-year life of the Proposed Action, while neutralization of the heap and final reclamation were being completed.

4.4.1. Geology and Mineral Resources

4.4.1.1. Impacts of the Complete Pit Backfill Alternative

Except for the complete backfilling of the East Pit, there would be no substantive difference in the impacts of the Complete Pit Backfill Alternative on geology and mineral resources from those identified for the Proposed Action (see Section 4.1.1.2). Under the Complete Pit Backfill Alternative, potential mineral resources exposed at the bottom of the East Pit which are not commercially minable under current economic conditions would be unavailable for subsequent mining without potentially cost-prohibitive removal of the backfilled waste rock. The effects of the Complete Pit Backfill Alternative on geology and mineral resources would be below the level of significance.

4.4.1.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design and incorporated by regulation which eliminate potentially significant effects on geology and mineral resources would be the same as those identified for the Proposed Action (see Section 4.1.1.3). No other measures would be necessary to reduce impacts of the Complete Pit Backfill Alternative below the level of

significance. The effects of the Complete Pit Backfill Alternative on geology and mineral resources would remain below the level of significance.

4.4.2. Soil Resources

4.4.2.1. Impacts of the Complete Pit Backfill Alternative

The impacts of the Complete Pit Backfill Alternative on soil resources would be essentially the same as the Proposed Action (see Section 4.1.2.2), except that with the complete backfilling of the East Pit with all of the waste rock from the South Waste Rock Stockpile, the potential for erosion within the Project area would decrease slightly. The effects of the Complete Pit Backfill Alternative on soil resources would be below the levels of significance.

4.4.2.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design and incorporated by regulation which eliminate potentially significant effects on soil resources would be the same as those identified for the Proposed Action (see Section 4.1.2.3). No other measures would be necessary to reduce impacts of the Complete Pit Backfill Alternative below the level of significance. The effects of the Complete Pit Backfill Alternative on soil resources would remain below the level of significance.

4.4.3. Hydrologic Resources

4.4.3.1. Impacts of the Complete Pit Backfill Alternative

The effects of the Complete Pit Backfill Alternative on surface and ground water resources would be generally the same as the effects of the Proposed Action (see Section 4.1.3.1.2 and Section 4.1.3.2.2). Any analysis of pit lake potential after mining (as described under the Proposed Action) would be unnecessary. All impacts on hydrologic resources of the Complete Pit Backfill Alternative would be below the level of significance.

4.4.3.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design and incorporated by regulation which eliminate potentially significant effects on surface water and ground water resources would be the same as those identified for the Proposed Action (see Section 4.1.3.1.3 and Section 4.1.3.2.3), except that the measures regarding the formation of a pit lake would be unnecessary. No other measures would be necessary to reduce impacts of the Complete Pit Backfill Alternative below the level of significance. The effects of the Complete Pit Backfill Alternative on surface water and ground water resources would remain below the level of significance.

4.4.4. Air Resources

4.4.4.1. Impacts of the Complete Pit Backfill Alternative

The impacts of the Complete Pit Backfill Alternative on air resources would be essentially identical to the impacts to air resource from the Proposed Action (see Section 4.1.4.2), except that those impacts associated with loading, hauling and dumping would continue after the completion of mining for another approximately 4.33 years as the waste rock was backfilled into the East Pit. The effects of the Complete Pit Backfill Alternative on air resources would be below the level of significance except for PM_{10}. Although the effects of the Complete Pit Backfill Alternative would be below the level of significance, the Complete Pit Backfill Alternative would still contribute to exceedences of the 24-hour CAAQS for PM_{10} which may continue to occur in the future during periods of high wind. This would remain a cumulatively significant effect.

4.4.4.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design and incorporated by regulation which eliminate potentially significant effects on air resources would be the same as those identified for the Proposed Action (see Section 4.1.4.3). No other measures are proposed to reduce impacts of the Complete Pit Backfill Alternative below the level of significance. The effects of the Complete Pit Backfill Alternative on air resources would remain below the level of significance except for PM_{10}. Although the effects of the Complete Pit Backfill Alternative would be mitigated to below the level of significance, the Complete Pit Backfill Alternative would still contribute to exceedences of the 24-hour CAAQS for PM_{10} which may continue to occur in the future during periods of high wind. This would remain a cumulatively significant effect.

4.4.5. Biological Resources

4.4.5.1. Impacts of the Complete Pit Backfill Alternative

<u>Vegetation and Plant Habitat</u>

The impacts of the Complete Pit Backfill Alternative on vegetation and plant habitat would be essentially identical to those under the Proposed Action. The same amount of surface disturbance would occur as under the Proposed Action. The time required to complete final reclamation would likely remain the same, and the other impacts to vegetation and plant habitat (from dust, ground water pumping, surface channel diversions, and sensitive plants) would also be essentially identical to those of the Proposed Action (see Section 4.1.5.2), and would remain below the level of significance. The amount of surface area not reclaimed (pit slopes not covered by backfill) would decrease from 165 acres under the Proposed Action to zero (0).

Wildlife, Wildlife Habitat and Wildlife Movement

The amount of wildlife habitat lost under the Complete Pit Backfill Alternative would be the same as that under the Proposed Action. Most of this habitat loss would be temporarily, until the completion of final reclamation (and subsequent vegetation recovery). However, it is likely that a somewhat larger percentage of the disturbed microphyll woodland habitat would be able to be reclaimed within the Project mine and process area as microphyll woodland habitat than the approximately one-half (½) reclaimed under the Proposed Action because more of the land is being reclaimed at approximately natural grade. There would be no open pit slopes which would not be reclaimed, and there would be no open pit area over which wildlife could be killed or injured by falls or from opportunistic. These impacts would be below the level of significance.

The Complete Pit Backfill Alternative would expose wildlife and wildlife habitat to the same impacts from vehicles, hazardous materials, noise, human presence, etc., as the Proposed Action. These effects would be below the level of significance. Other impacts from the Complete Pit Backfill Alternative on wildlife and wildlife habitat (from ground water pumping, surface channel diversions, and sedimentation) would also be essentially identical to those of the Proposed Action (see Section 4.1.5.3). They would also remain below the level of significance.
The impacts of the Complete Pit Backfill Alternative on the desert tortoise would be the same as the Proposed Action, and would be above the level of significance.

4.4.5.2. Mitigation Measures

Measures to reduce the effects of the Complete Pit Backfill Alternative on biological resources would be the same as those measures identified for the Proposed Action (see Section 4.1.5.4), except that the measures to reclaim off-site lands for lands not reclaimed on-site and to backfill the East Pit to prevent the formation of a pit lake are unnecessary. With implementation of the identified measures, the mitigated effects of the Complete Pit Backfill Alternative on biological resources would be below the level of significance.

4.4.6. Cultural and Paleontological Resources

4.4.6.1. Impacts of the Complete Pit Backfill Alternative

The Complete Pit Backfill Alternative would result in impacts on cultural resources which are identical to those created by the Proposed Action (see Section 4.1.6.2), except that following backfilling of the East Pit and final reclamation, the visual intrusion into the Indian Pass-Running Man ATCC would be somewhat reduced. The Complete Pit Backfill Alternative would still have a significant adverse impact on cultural resources eligible for the NRHP, and on the Indian Pass-Running Man ATCC.

4.4.6.2. Mitigation Measures

Measures to reduce the significant effects of the Complete Pit Backfill Alternative on cultural resource features identified within the overbuilt 92 kV/34.5 kV transmission line corridor, or within the Project area, which were determined eligible for the NRHP under criterion "D" would be identical to those identified for the Proposed Action. The mitigated impacts would be reduced below the level of significance. Measures to reduce the significant effects of the Complete Pit Backfill Alternative on cultural resource features determined eligible for the NRHP under criteria "A", "B," or "C" which were identified within the Complete Pit Backfill Alternative project area, or to reduce the significant effects of the Complete Pit Backfill Alternative on the Indian Pass-Running Man ATCC, would be identical to those identified for the Proposed Action. The mitigated effects of these impacts would remain above the level of significance and be unavoidable.

4.4.7. Visual Resources

4.4.7.1. Impacts of the Complete Pit Backfill Alternative

The effect of the Complete Pit Backfill Alternative on visual resources from the lighting of mine and process areas and visibility reduction from the emission of dust would be identical to the Proposed Action (see Section 4.1.7.2). These effects would be above the level of significance from mine and process area lighting, and less than significant from visibility reduction.

The visual contrasts of the Complete Pit Backfill Alternative created by changes in line and form from the creation of new structures and facilities, altered surface colors, textures and vegetation cover, and changes in topography would differ in both degree and extent from the Proposed Action because of the backfilling of the East Pit with all of the waste rock from the waste rock stockpiles. When viewed from KOP #1 (Ogilby Road) or from KOP #4 (the informal overnight camping area), the Complete Pit Backfill Alternative would look like the view of the Proposed Action from the same point (see Figure 4.3 and Figure 4.9), except that only the heap would be visible, since the entire South Waste Rock Stockpile would have been removed to backfill the East Pit. The view of the Project mine and process area from KOP #2 (Black Mountain) and from KOP #3 (a hill south of Indian Pass in the Picacho Peak Wilderness Area) following the completion of final reclamation under the Complete Pit Backfill Alternative would differ more from the Proposed Action because of the backfilling of all of the pits and the elimination of all of the waste rock stockpiles (see Figure 4.14 and Figure 4.15). Because the heap would remain as a large alteration in the topography, the effect of the Complete Pit Backfill Alternative on visual resources would be above the level of significance.

4.4.7.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design which eliminate potentially significant effects on visual resources would be the same as those identified for the

Proposed Action (see Section 4.1.7.3). Measures to reduce the significant effects of the Complete Pit Backfill Alternative on lighting would also be the same as those measures identified for the Proposed Action. With implementation of the identified measures, the mitigated effects of the Complete Pit Backfill Alternative on visual resources from visibility reduction and lighting would be below the level of significance. The mitigated effects of the Complete Pit Backfill Alternative on visual resources from changes in line and form would remain above the level of significance.

4.4.8. Noise

4.4.8.1. Impacts of the Complete Pit Backfill Alternative

Noise generated by the Complete Pit Backfill Alternative would be essentially identical to the noise generated by the Proposed Action, and the effects of this noise on potential noise receptors would also be essentially identical as for the Proposed Action (see Section 4.1.8.2). However, the Complete Pit Backfill Alternative would also continue the relatively greater noise-producing operations (loading, hauling, and dumping, but not blasting) for approximately 4.33 years longer than the Proposed Action. The impacts of noise from the Complete Pit Backfill Alternative would be below the levels of significance.

4.4.8.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design and incorporated by regulation which eliminate potentially significant effects of noise would be the same as those identified for the Proposed Action (see Section 4.1.8.3). No other measures would be necessary to reduce impacts of the Complete Pit Backfill Alternative below the level of significance. The noise effects of the Complete Pit Backfill Alternative would remain below the level of significance.

4.4.9. Land Use

4.4.9.1. Impacts of the Complete Pit Backfill Alternative

The compatibility of the Complete Pit Backfill Alternative with existing land uses and adopted land use policies and plans would be essentially identical to that of the Proposed Action (see Section 4.1.9.2). Blasting during mining operations could be a significant potential hazard to low-flying military aircraft using the general area for training exercises. The Complete Pit Backfill Alternative's impact on recreational use of the area, including wilderness use, would be essentially identical to that of the Proposed Action. These impacts would be below the level of significance.

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Figure 4-14: Complete Pit Backfill Alternative - Projected View of the Project Mine and Process Area from Black Mountain (KOP#2)

Figure 4-15: Complete Pit Backfill Alternative - Projected View of the Project Mine and Process Area from a Hilltop Near Indian Pass in Picacho Peak Wilderness (KOP#3)

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4.4.9.2. Mitigation Measures

Measures to ensure the compatibility of the Complete Pit Backfill Alternative with existing land uses, adopted land use policies and plans, and recreational use of the area would be the same as those measures identified for the Proposed Action (see Section 4.1.9.2). With implementation of the identified measures, the mitigated level of compatibility of the Complete Pit Backfill Alternative with existing land uses, adopted land use policies and plans, and recreational use of the area, would be below the level of significance.

4.4.10. Socioeconomics

4.4.10.1. Impacts of the Complete Pit Backfill Alternative

The Complete Pit Backfill Alternative would have the same beneficial, less-than-significant socioeconomic effects as the Proposed Action (see Section 4.1.10.2). In addition, to complete the backfilling of the East Pit, additional wages, purchases of fuel, replacement equipment and maintenance, and other goods and services would be required, and this would be additional money placed into the economy. These additional costs have been estimated, using a conservative industry average of \$0.40 to \$0.50 per ton of material loaded, hauled and dumped, at between \$80 and \$100 million. The level of economic effect would remain less than significant.

4.4.10.2. Mitigation Measures

No mitigation measures are proposed or recommended.

4.4.11. Roads and Public Services

4.4.11.1. Impacts of the Complete Pit Backfill Alternative

The Complete Pit Backfill Alternative would result in essentially identical increases in traffic and realignment of Indian Pass Road as the Proposed Action (see Section 4.1.11.1.2). The effects would be below the level of significance. The Complete Pit Backfill Alternative would also create the potential for impacts from "spur" roads, which would be below the level of significance.

The Complete Pit Backfill Alternative would have an essentially identical impact on utilities as the Proposed Action (see Section 4.1.11.1.2). All impacts on utilities would be below the level of significance. The Complete Pit Backfill Alternative would also have similar impact on public services as the Proposed Action (see Section 4.1.11.3.2). These impacts would be below the level of significance.

4.4.11.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design and incorporated by regulation which eliminate potentially significant effects on roads, utilities and public services would be the same as those measures identified for the Proposed Action (see Section 4.1.11.1.3, Section 4.1.11.2.3, and Section 4.1.11.3.3). No other measures would be necessary to reduce impacts of the Complete Pit Backfill Alternative below the level of significance. The effects of the Complete Pit Backfill Alternative on roads, utilities and public services would remain below the level of significance.

4.4.12. Emergency Services and Public Safety

4.4.12.1. Impacts of the Complete Pit Backfill Alternative

The Complete Pit Backfill Alternative would have similar impacts on emergency services and public safety as the Proposed Action (see Section 4.1.12.2). Because the East Pit would be completely backfilled, the potential public safety concerns from the open East Pit would be eliminated. The effects of the Complete Pit Backfill Alternative on emergency services and public safety would be less than significant.

4.4.12.2. Mitigation Measures

Mitigation measures incorporated into the Complete Pit Backfill Alternative design and incorporated by regulation which eliminate potentially significant effects on emergency services and public safety would be the same as those measures identified for the Proposed Action (see Section 4.1.12.3), except that no measures would be necessary to barricade any open pits. No other measures would be necessary to reduce impacts of the Complete Pit Backfill Alternative below the level of significance. The effects of the Complete Pit Backfill Alternative on emergency services and public safety would be below the level of significance.

4.4.13. Other Resources

4.4.13.1. Impacts of the Complete Pit Backfill Alternative

The Complete Pit Backfill Alternative would have essentially identical impacts on other resources as would the Proposed Action (see Section 4.1.13). The effects of the Complete Pit Backfill Alternative on other resources would be less than significant.

4.4.13.2. Mitigation Measures

No mitigation measures are proposed or recommended.

4.5. No Action Alternative

Under the No Action Alternative, the Proposed Action would not be constructed, and precious metals within the Project mine and process area not be mined under the submitted Plan of Operations. As discussed in Section 2.2.4, if the No Action Alternative is adopted, the Project area would remain as it currently is, and existing dispersed recreational and other uses of the Project area would continue.

4.5.1. Geology and Mineral Resources

No adverse impacts on geology or mineral resources would result from the No Action Alternative, and the identified precious mineral resources would remain in place pending other proposals for development.

4.5.2. Soil Resources

No adverse impacts on soil resources in the Project area would result from implementation of the No Action Alternative.

4.5.3. Hydrologic Resources

No adverse impacts on surface water or ground water resources would result from implementation of the No Action Alternative.

4.5.4. Air Resources

Local exceedences of the CAAQS for PM_{10} have occured in the past, and may continue in the future, during periods of high winds, even with implementation of the No Action Alternative. This would be a cumulatively significant effect.

4.5.5. Biological Resources

No adverse impacts on biological resources would result from implementation of the No Action Alternative.

4.5.6. Cultural and Paleontological Resources

No adverse impacts on cultural or paleontological resources would result from implementation of the No Action Alternative.

4.5.7. Visual Resources

No adverse impacts on visual resources would result from implementation of the No Action Alternative.

4.5.8. Noise

No adverse noise impacts would result from implementation of the No Action Alternative.

4.5.9. Land Use

The existing land use within, and in the vicinity of, the Project area would likely continue under the No Action Alternative.

4.5.10. Socioeconomics

The No Action Alternative would not create the 120 job opportunities, nor the estimated $7 million in annual payroll, from the Proposed Action. The No Action Alternative would result in the loss of the $48 million initial capital expenditures, $1.7 million annual capital expenditures, and the $26 million per year non-capital expenditures and associated taxes and benefits to the local economy projected by the Project.

4.5.11. Roads and Public Services

No adverse impacts on roads, utilities, or public services from implementation of the No Action Alternative.

4.5.12. Emergency Services and Public Safety

No adverse impacts on emergency services or public safety would result from implementation of the No Action Alternative.

5. CUMULATIVE EFFECTS

5. CUMULATIVE EFFECTS

5.1. Introduction

As required under NEPA and CEQA, this chapter addresses the potential for cumulatively significant effects on the environmental resources in the surrounding area which could result from the implementation of the Proposed Action and other past, present and reasonably foreseeable future projects in the general vicinity of the Project. A cumulative impact is defined under federal regulations as:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individual minor but collectively significant actions taken place over a period of time" (40 CFR 1508.7).

The State of California CEQA guidelines define cumulative impacts as:

> "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (14 CCR 15355).

The geographical area considered for the analysis of cumulative effects may vary in size and shape to reflect each environmental resource which is evaluated. For this cumulative impact analysis, the potentially affected resources are located in a study area which is generally bounded by the Colorado River to the east; the Chocolate Mountains to the northwest; the Algodones Sand Dunes/East Mesa to the west; and the Mexican border to the south (see Figure 5.1).

Based upon the analysis of the environmental resources conducted in Chapter 4 of this EIS/EIR and identification of the cumulative projects (see Section 5.2), the following elements of the human environment could be potentially subject to cumulatively significant impacts: hydrologic resources, air resources, biological (wildlife and wildlife habitat) resources, cultural resources, visual resources, and recreation resources. These potential cumulatively significant effects are each analyzed in Section 5.3. Project-specific impacts may occur from each of these projects to other environmental resources, but these impacts would not be cumulatively significant.

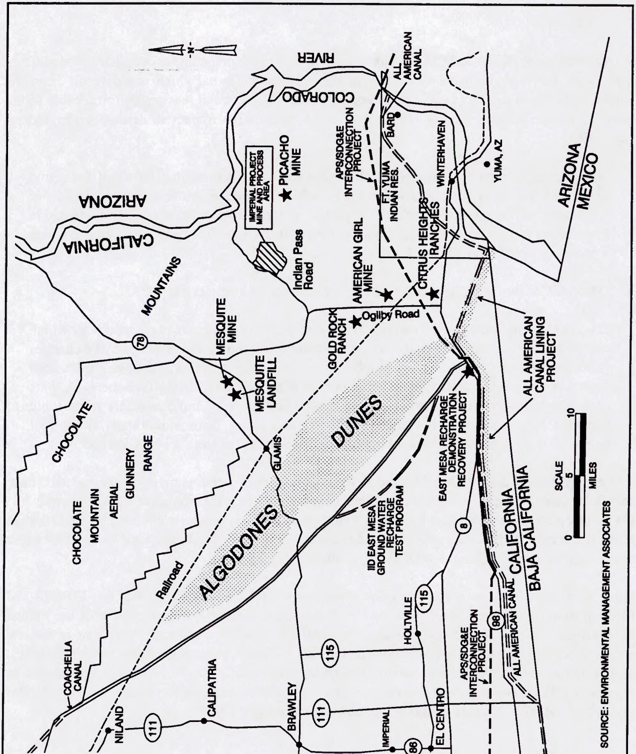

Figure 5.1: Locations of the Projects Considered in the Cumulative Impacts Analysis

5.2. Past, Present, and Reasonably Foreseeable Activities in the Area of Cumulative Analysis

The individual projects described below comprise the past, present, and reasonably foreseeable future projects identified by Imperial County, the BLM, El Centro Resource Area, other agencies and the public. The uses have been categorized into mining uses, commercial uses, water conservation projects, military uses, and recreational uses. All of these projects and uses have the potential to impact the environmental resources of concern within the area of the cumulative impacts analysis. The reasonably foreseeable future analysis for this EIS/EIR was evaluated for a 20-year time frame, based on the estimated potential future life of the Proposed Action.

5.2.1. Mining Uses

5.2.1.1. American Girl Mine Project

The following description of the American Girl Mine Project was obtained from the Draft EIS/EIR which was prepared on behalf of the U.S. Bureau of Land Management by P.M. DeDyker and Associates (BLM 1994a), as updated by the cited sources.

The American Girl Mine Project consisted of two (2) adjacent operating components, the Padre Madre operation and the American Girl Canyon operation (see Figure 5.1). The American Girl Canyon and Padre Madre operations were originally scheduled to cease mining operations in 1994, although operations continued into 1996. A third component, the Oro Cruz operation of the American Girl Mine Project, began operations in late 1995. Although scheduled to cease mining operations by 1999, all mining operations were terminated in 1997. Reclamation activities are currently underway at all of the American Girl Mine Project facilities, and are expected to last until mid-2001.

The Padre Madre operation involved the annual mining and heap leaching of approximately 200,000 tons of ore, and the annual mining and stockpiling of approximately 400,000 tons of waste rock. Cumulative totals of 3.5 million tons of ore and 12.5 million tons of waste rock were authorized. The American Girl Canyon operation was authorized to extract 8.5 million tons of surface- and underground-mined ore, and excavate and stockpile 17 million tons of waste rock. The cumulative total surface disturbance for both of these operations was estimated to be 618 acres.

As proposed, mining activities associated with the Oro Cruz operation (pits, waste dumps, haul roads, etc.) would directly disturb an estimated 191 acres. Ore processing and milling would be conducted at the existing American Girl Canyon facility. Surface mining at the Oro Cruz operation would cumulatively produce approximately 2.5 million tons of ore and 8.5 million tons of waste rock at maximum yearly rates of approximately 1.2 million tons of ore and 3.5 million tons of waste rock. During this same time underground mining would produce approximately 65,000 tons of waste rock and 500,000 tons of ore, at a maximum rate of approximately 250,000 tons of ore per year.

Water required for mining, milling and heap leach processing was to be supplied from ground water produced from the American Girl well southwest of American Girl Canyon. The maximum yearly consumptive use for the Oro Cruz operation was not expected to exceed 300 acre-feet.

5.2.1.2. Mesquite Mine

The Mesquite Mine and associated facilities occupy a total of approximately 5,200 acres of land east of Glamis (Environmental Solutions, Inc. 1987) (see Figure 5.1). Approximately 3,100 acres of the total project area are public lands managed by the BLM. Approximately 4,000 acres of the 5,200-acre Project area have been, or would eventually be, disturbed by the mining activities. Disturbed areas would include approximately ten (10) overburden stockpiles, which would be used to dispose of approximately 350 million tons of waste rock. These overburden piles are projected to reach heights of about 280 feet above the existing ground surface. Other disturbed areas include the four (4) open pits, the approximately 1,000 acres of lined heap leach pads, mine access roads, utility infrastructure, and other ancillary facilities (Environmental Solutions, Inc. 1987).

The Mesquite Mine, which began operating in 1985, is currently operating under an Imperial County conditional use permit which was amended on January 8, 1997 to increase the authorized annual amount of mined material to 60 million tons and the amount of ore mined to 25 million tons (Personal Communication, Jesse Soriano, ICPBD, May 5, 1997). Over its life, the Mesquite Mine would extract a total of approximately 440 million tons of gold-bearing ore and barren rock from four (4) open pits by the anticipated closure within the next nine (9) to fourteen (14) years.

Water consumption is expected to be approximately 1,000 afy (BLM and ICPBD 1995). Water is supplied by a system consisting of three (3) 2,500-gpm capacity water wells located approximately three (3) miles south of the mine (Environmental Solutions, Inc. 1993a).

5.2.1.3. Picacho Mine

The following description of the Picacho Mine operation was obtained from personal communications with Glamis Imperial (Personal Communication, C.K. McArthur, Chemgold, 1995).

Chemgold, Inc. operates the Picacho Mine, which is located in easternmost Imperial County, California, approximately eighteen (18) miles north of Yuma, Arizona (see Figure 5.1). The Picacho Mine property consists of 600 acres of fee lands and 1,650 acres of unpatented lode mining claims. The total disturbed area at the Picacho Mine amounts to approximately 330 acres.

Since 1980, open-pit, run-of-mine, heap leach gold mining and processing has occurred at the Picacho Mine. Four (4) open pit deposits have been developed, with current total annual mining averaging approximately 1.5 million tons of ore and 7.0 million tons of waste. Development of an additional 3.6 million tons of ore reserves is now nearly completed, which is projected to be the final phase of mining at Picacho Mine. The completed pits and heaps are currently undergoing

reclamation. Mining is expected to terminate in early 1998, with processing and reclamation activities scheduled to continue until 2001 (Personal Communication, Jesse Soriano, ICPBD, May 5, 1997).

Water for mining and processing operations is supplied by pipeline to the mine from a shallow well located adjacent to, and which is assumed to produce water recharged from, the Colorado River river aquifer. Water from the Colorado River is used through a present-perfected water right to 115 afy of water held by the property and verified by contract with the USBR. The Picacho Mine uses the entire annual 115 afy allocation of water from the Colorado River river aquifer. No local ground water is used at the Picacho Mine due to the lack of a sufficient aquifer in this location.

5.2.1.4. Mineral Exploration

Mineral exploration activities are ongoing to some extent at each of the mines within the cumulative impacts study area. However, these activities would not substantially impact the resources of concern because they have already been accounted for in the impacts resulting from the mine operations themselves.

5.2.2. Commercial Uses

5.2.2.1. Mesquite Regional Landfill

The Mesquite Regional Landfill is a proposed new regional Class III sanitary landfill, to be located in Imperial County adjacent to the existing Mesquite Mine (BLM and ICPBD 1995) (see Section 5.2.1.2). The landfill would accommodate up to a total of 600 million tons of municipal solid waste residue and would have a life span of approximately 100 years. The municipal solid waste residue would be transported to the landfill from various Southern California communities via the existing Southern Pacific Transportation Company main line rail track and a short new railroad spur extending from the main line rail track to the landfill site. The landfill would be constructed on land recently subject to an exchange by the BLM for other land in the Santa Rosa Mountains Natural Scenic Area and near the Chuckwalla Bench ACEC. The landfill property covers approximately 4,245 acres, although the actual landfill footprint is expected to occupy approximately 2,290 acres. Approximately 588 acres of the landfill site has been extensively disturbed by previous on-site activities, and vegetation over an area of approximately 3,657 acres would be disturbed.

The proposed landfill anticipates the use of water supplied from the existing Mesquite Mine ground water well field, located approximately three (3) miles south of the landfill site. The three (3) wells each have estimated maximum yields of 2,500 gallons per minute (gpm). The average annual water usage associated with the landfill operations is expected to be less than 1,000 acre-feet per year.

5.2.2.2. Gold Rock Ranch

The following description of the Gold Rock Ranch was provided by the BLM (Personal Communication, A. Schoeck, BLM, 1997) and ICPBD (Personal Communication, John L. Morrison, ICPBD, October 10, 1997). Gold Rock Ranch is a privately-owned area that, until recently, was owned by a single family. Gold Rock Ranch is located approximately seven (7) miles southwest of the Project mine and process area.

Gold Rock Ranch is a mobile home/RV park which operates under a permit from Imperial County. This permit authorizes the accommodation of 21 mobile homes and 14 RV's. Water, sewer, and electrical hookups are provided. A small country store is also located on the site. Primary usage is during the winter months.

An on-site well is used to supply domestic water for Gold Rock Ranch. Current average usage is estimated at 5,000 gpd (less than 6 afy), with an estimated historic maximum usage rate of 12,000 gpd (less than 14 afy), as estimated by the former owner (BLM 1994a). Surface disturbance associated with Gold Rock Ranch is estimated at 20 acres.

5.2.2.3. Agricultural Projects

Citrus Heights Ranches received a Conditional Use Permit (CUP) from Imperial County which allows for the reactivation and operation of three (3) water wells on approximately 475 acres of land in Section 8, Township 16, Range 21 East, SBB&M. The site is located approximately two (2) miles east of the intersection of Ogilby Road and Interstate Highway 8 (ICPC 1995).

Citrus Height's Conditional Use Permit was amended on April 9, 1997 to allow the pumping of up to 2,800 acre-feet of ground water per year for agricultural purposes. The existing site is fallow farm land which was previously used to grow jojoba. Other than the improvements to the three (3) wells, the only other new improvements would be for the installation of irrigation systems (Imperial County Planning Department 1997).

5.2.3. Water Conservation Projects

5.2.3.1. All American Canal Lining Project

The following description of the All American Canal Lining Project was obtained from Imperial Irrigation District's Notice of Determination filed with the County Clerk of Imperial County.

The Imperial Irrigation District proposes to build a parallel concrete canal along the All American Canal from 1.6 miles west of Rock Section 2 (one (1) mile west of Pilot Knob) to Drop 3 (a total of 23 miles) to conserve water lost by seepage. The project would conserve approximately 67,700 acre-feet per year. The project was authorized by Congress in Title II of Public Law 100-675.

Construction of the project would result in the emissions of PM_{10}, although dust from excavation and grading operations would be localized and controlled by sprinkling access roads and exposed areas with water. Implementation of this project would also reduce ground water recharge to the Amos-Ogilby-East Mesa ground water basin and would reduce or eliminate the wetland vegetation, and wetland habitat-dependent wildlife, which has developed from this leaking water along the adjacent unlined portion of the canal. However, plans for construction of this canal lining project have been suspended and there is no current schedule for implementation (Personal Communication, Michael Walker, USBR, 1996).

5.2.3.2. U.S. Bureau of Reclamation East Mesa Recharge Demonstration Recovery Project

The following description of the USBR East Mesa Recharge Demonstration Recovery Project (USBR East Mesa Recharge Project) was obtained from the Final EIS/EIR for the proposed Mesquite Regional Landfill (BLM and ICPBD 1995).

The USBR East Mesa Recharge Project involves the development of a recharge/recovery operation in the vicinity of the All American Canal at the Coachella Canal branch to demonstrate the feasibility and economics of recovering water lost from the unlined canal. The proposal involves the installation of four (4), 16-inch diameter pilot demonstration wells, each to be dug within the recharge area to a depth of approximately 70 feet along the west side of the old, unlined Coachella Canal. Water recovered from the wells would be diverted to the lined canal to the east through an 8-inch diameter pipe. The USBR intends on conducting the recovery test by pumping 1,000 acre-feet of water from the East Mesa Basin over a one (1)-year period. Approximately an equivalent volume of water would be recharged to the area from the unlined canal, thereby resulting in no net loss of ground water in the East Mesa Basin during the test. If the recharge and recovery process proves successful, the USBR has indicated that the project could be made permanent, but the potential for long-term recharge and recovery pumping is uncertain and beyond the scope of this cumulative impact assessment.

5.2.3.3. Imperial Irrigation District East Mesa Ground Water Recharge Test Program

The following description of the IID East Mesa Ground Water Recharge Test Program (IID East Mesa Recharge Program) was obtained from the Draft Mitigated Negative Declaration prepared by the IID for the IID East Mesa Recharge Program (IID 1997).

The IID East Mesa Recharge Program is a proposal to augment ground water in storage under East Mesa through the infiltration of excess water flows from the Colorado River, then recover most of the infiltrated water in times of lower water availability. The project is proposed for implementation in early 1998, when excess flood releases from Hoover Dam and Parker Dam would be available from the Colorado River. Approximately 20,000 AF of this excess flood water, or about four (4) percent of the excess flood flows available in 1997, would be diverted from the Colorado River down the All American Canal, then into the lined Coachella Canal, then into a section of the old,

unlined branch of the Coachella Canal, where the water would infiltrate into the East Mesa aquifer as it did before the lining of the Coachella Canal in the early 1980's (see Section 3.3.2). As much as 90 percent of the infiltrated water would be recovered through pumping, which would essentially eliminate any net recharge to the East Meas ground water aquifer. The current program proposes only the 1998 test, but the potential for long-term recharge is possible if the test program is successful and excess flood flows are available in the future. However, this is beyond the scope of this cumulative impact assessment.

Implementation of the IID East Mesa Recharge Program may temporarily displace some dispersed OHV recreational activity which has developed within the old Coachella Canal, and may temporarily affect a small amount of flat-tailed horned lizard habitat. No appreciable new surface disturbance would be necessary, and there would be little emission of PM_{10}.

5.2.4. Military Uses

5.2.4.1. Chocolate Mountain Aerial Gunnery Range

The USMC maintains the Chocolate Mountain Aerial Gunnery Range (CMAGR) which, at its closest, is approximately ten (10) miles northwest of the Project area, immediately north of the Mesquite Mine and State Route 78. The CMAGR is actively used by various branches of the U.S. Armed Forces for military aircraft training and testing and for live ordnance delivery practice (BLM and ICPBD 1995).

The activities associated with the CMAGR substantially increase ambient noise levels in the area during the activities (BLM and ICPBD 1995). The resulting increase in noise levels disrupts and alters sensitive wildlife species and their migratory patterns for intermittent short-term, and possibly long-term, periods. Low-level military overflights and ordnance explosions also contribute to airborne dust generation and some loss of vegetation and wildlife habitat.

5.2.4.2. Other Military Uses

The USMC conducts both daytime and nighttime helicopter flight training on public lands in and around the Project area and vicinity (Personal Communication, T.A. Manfredi, USMC, June 2, 1995). These training exercises are conducted at low-levels, sometimes including touch downs. The nighttime training includes the use of night vision goggles (NVG) and other night vision devices (NVD). This activity can increase ambient noise levels, increase airborne dust generation, and disturb both wildlife and recreational users (campers, hikers, etc.).

Two (2) military Visual Flight Rule (VFR), low-level flying routes for fixed wing aircraft are also located in the vicinity of the Project area and cumulative impact study area (Personal Communication, T.A. Manfredi, USMC, June 2, 1995). VFR-299 (445th Military Airlift Wing-March Air Force Base) and VFR-1266, -1267, and -1268 (Marine Air Group-13-MCAS

Yuma) each consist of six (6)±-mile wide flight corridors which are used by fixed-wing military aircraft during training or travel. Aircraft use of the VFR corridors through the cumulative impacts study area has the potential to also increase ambient noise levels, increase airborne dust generation, and disturb both wildlife and recreational users, although to a lesser extent than the low-level helicopter use.

5.2.5. Recreational Uses

Dispersed recreational activities, including OHV uses, hunting, rock hounding, and camping, are conducted in the cumulative impacts study area. These activities have the continuing potential to adversely impact environmental resources within the described cumulative impacts study area.

OHV, hunting, rock hounding, and camping activities can impact air quality by increasing airborne dust generation from soils and pollutant emissions. These activities also place increased pressure on wildlife and have the potential for long-term impact on wildlife habitat. Dispersed recreational activities can also be a contributing factor in the destruction of cultural resources.

5.3. Evaluation of Potential Cumulative Impacts and Mitigation

5.3.1. Hydrologic Resources (Ground Water)

The existing ground water in storage in the Amos-Ogilby-East Mesa Basin has been estimated at 230 million acre-feet (126 million acre-feet in the Amos-Ogilby Basin alone), and the amount of recharge to the Amos-Ogilby-East Mesa Basin has recently been estimated to be 30,000 afy (see Section 3.3.2.1). The cumulative maximum total of annual ground water consumption from the basin by the relevant identified cumulative projects, including the Proposed Action, totals approximately 6,306 afy. Figure 5.2 presents a graph of the annual gross recharge to the Amos-Ogilby-East Mesa Basin, the annual consumption by applicable projects, and the resulting net recharge to the Amos-Ogilby-East Mesa Basin, for each year from 1998 through the year 2017. As shown, the annual consumption of ground water by all of these wells together is a relatively small percentage (a maximum of approximately twenty (20) percent) of the gross estimated recharge to the Amos-Ogilby-East Mesa Basin. The All American Canal Lining Project, if constructed, would probably result in only an estimated reduction in recharge to the basin of 6,770 afy (two-thirds (2/3) of the 10,000 afy assumed to seep into the Amos-Ogilby-East Mesa Basin). However, even with this reduction, the net recharge to the Amos-Ogilby-East Mesa Basin would still exceed the cumulative ground water consumption from the identified projects and uses. As stated in Section 5.2.3.1, the All American Canal Lining Project is currently on hold and has no schedule for implementation.

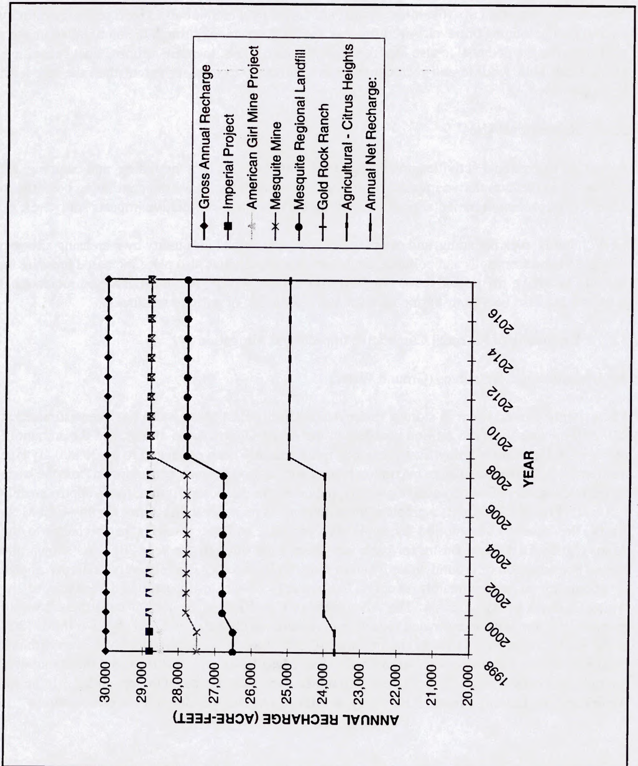

Figure 5.2: Cumulative Ground Water Consumption and Recharge from the Amos-Ogilby-East Mesa Basin

The maximum total estimated cumulative annual consumption of ground water by the cumulative projects within the Amos-Ogilby-East Mesa Basin also represents approximately 0.003 percent of the ground water currently estimated stored in the Amos-Ogilby-East Mesa Basin (or approximately 0.005 percent of the ground water currently estimated stored in the Amos-Ogilby Basin alone). Based upon ground water drawdown estimates provided for the Project wells alone (see Section 4.1.3.2.2), and because these cumulative projects are widely scattered and the ground water consumption distributed, there should be no significant interference between the projects from their individual uses of the ground water resources. No mitigation measures are recommended.

5.3.2. Air Resources

The identified individual projects within the cumulative study area each emit most or all of the criteria air pollutants. However, since the monitored levels of these pollutants are well below the applicable established NAAQSs and CAAQSs and the ambient levels of these pollutants produced by the Proposed Action are low, the addition of these criteria pollutants emitted by the Proposed Action to those from these cumulative projects would be below the level of significance

Emissions of O_3 precursors (NOx and ROGs) from the Proposed Action could potentially contribute to exceedences of the NAAQS and CAAQS for O_3. However, much of the O_3 in Imperial County is transported into the basin from the South Coast Air Basin to the north and the Mexicali basin to the south, and are not formed from the reaction of O_3 precursors within the Salton Sea Air Basin. Emissions of O_3 precursors by the cumulative projects are also not likely to react to form O_3 within the basin, and thus there is little potential for a significant cumulative impact from O_3.

As with the Proposed Action, the principal pollutant of concern emitted or generated by the identified cumulative projects is PM_{10}. To evaluate the potential cumulative impacts from PM_{10} from the reasonably foreseeable future projects within the cumulative assessment area, the Air Quality Analysis conducted for the Proposed Action (see Appendix O) included calculations of the maximum 24-hour concentration of PM_{10} resulting from the Proposed Action at each of the other substantial sources of PM_{10} within the cumulative assessment area, including the American Girl Mine, the Picacho Mine, the Mesquite Mine, and the Mesquite Regional Landfill. Of these sources, both the American Girl Mine and the Picacho Mine are existing sources which are in the process of closing (their emissions of PM_{10} have been or are being reduced), and the Mesquite Mine is an existing source which is continuing. The effects of the emissions of PM_{10} from these projects are included in the ambient PM_{10} concentrations currently being monitored. However, the Mesquite Regional Landfill has not yet been constructed, and is not yet operating or producing PM_{10}.

The maximum 24-hour ambient PM_{10} concentration predicted from modeling Project emissions of PM_{10} were 0.61 $\mu g/m^3$ at the Mesquite Regional Landfill. When this predicted value is added to the 27.4 $\mu g/m^3$ maximum 24-hour ambient PM_{10} concentration predicted by modeling conducted for the Mesquite Regional Landfill (BLM and ICPBD 1995), and the 19.9 $\mu g/m^3$ "background" annual ambient concentration monitored (at the Mesquite Mine) for the Mesquite Regional Landfill is also

added, the total combined concentration of 47.9 $\mu g/m^3$ is still below the 24-hour ambient PM_{10} CAAQS of 50 $\mu g/m^3$. Thus, the cumulative impact of PM_{10} emissions from all of the cumulative projects is expected to be below the level of significance during typical conditions. However, local exceedences of the CAAQS for PM_{10} have occured in the past, and may continue in the future, during periods of high winds. The Proposed Action would contribute to these future exceedences during periods of high wind since there would still be a net increase in PM_{10} emissions from the Proposed Action. This would be a cumulatively significant effect.

Mitigation measures to reduce emissions of PM_{10} from the cumulative projects (and the many other sources of PM_{10}) are already contained in the ICAPCD regulations, and implementation of these rules and regulations are directed at reducing PM_{10} emissions sufficiently to attain compliance with the NAAQS and CAAQS in the future.

5.3.3. Biological Resources

Plant and wildlife habitat would be adversely impacted by the cumulative effects of the identified projects. Surface disturbance within the respective project areas would result in a direct loss of habitat. In addition, the quality of habitat in neighboring areas would be indirectly impacted by project noise, surface disturbance, dust, and other off-site intrusions. Direct impacts are semi-quantifiable in terms of habitat loss, but indirect biological impacts are much more difficult to assess as they vary with site-specific conditions and the sensitivity of the species which occur in the respective habitat types impacted. A distinction can also be made between the cumulative temporary losses of habitat that is removed over the active life of project activities but can be reclaimed after project activities have been completed, and permanent losses of habitat that remain indefinitely at the end of project activities and after the respective project sites are closed. Both direct and indirect, and temporary and permanent, cumulative impacts result from the existing and reasonably foreseeable projects identified.

As discussed in Section 3.5, multiple species of plants and wildlife were observed within the Project area or are known or suspected to occur within the areas of one or more of the projects evaluated by this cumulative impact assessment. Special-interest species (i.e., listed species, USFWS special status species, BLM sensitive species, etc.) which are known or suspected to be "resident" species in one or more of the project areas include: cheeseweed owlfly, flat-tailed horned lizard, chuckwalla, desert tortoise, loggerhead shrike, crissal thrasher, black-tailed gnatcatcher, and long-eared owl. A cumulative, incremental loss of primary breeding or nesting habitat for these species results from the projects.

Special-interest species which may make "permanent" use of one or more of the project areas for varied uses (i.e., foraging, roosting or resting) include: desert bighorn sheep, Yuma puma/mountain lion, American badger, burrowing owl, prairie falcon, barn owl, California leaf-nosed bat, greater western mastiff bat, spotted bat, Townsend's big-eared bat, Yuma myotis, cave myotis, small-footed

myotis, occult little brown bat, and desert pallid bat. A cumulative incremental loss of foraging, roosting, resting, or other limited habitat use results from the projects for these species.

Special-interest species which may make "occasional" use of one or more of these cumulative project areas as migrant or seasonal foraging or resting areas, primarily in the winter months, include: northern harrier, sharp-shinned hawk, peregrine falcon, golden eagle, ferruginous hawk, Cooper's hawk, Gila woodpecker, and Vaux's swift. An incremental loss of seasonal or transient habitat for these species results from these cumulative projects.

Many other wildlife species are also known to use one or more of the cumulative project areas for resident, permanent, and occasional uses (see Section 3.5.6). Notable among these species is mule deer, which is a permanent resident species, and other game species such as Gambel's quail, mourning dove, and white-winged dove. Other common mammals include: antelope ground squirrel, Merriam kangaroo rat, desert woodrat, black-tailed jackrabbit, kit fox, coyote, and wild burro. A cumulative incremental loss of habitat results for these and other permanent, resident, or migrant species which use one or more of the cumulative project areas. Similarly, a cumulative incremental loss of habitat results for both sensitive plant species and common plants which occur in the areas disturbed by one or more of the identified projects.

The cumulative surface disturbance from all of the identified mine projects would total approximately 6,552 acres. The approximate areas of surface disturbance from the other identified cumulative projects and non-dispersed activity areas with surface disturbance include the Mesquite Regional Landfill (3,657 acres), Gold Rock Ranch (20 acres), and Citrus Heights (475 acres). Thus, the combined concentrated areas of surface disturbance total approximately 10,686 acres of potential desert vegetation and wildlife habitat that is or would be unavailable over the respective lives of these projects. However, these individual projects in the cumulative impact analysis are dispersed over a regional area at least 20 miles long by 15 miles wide (approximately 300 square miles, or nearly 200,000 acres) in which large vacant tracts of land, with similar vegetation and wildlife habitat, remain.

Dispersed recreation and military uses of the area put added pressure on wildlife species, in particular on game species and on wildlife intolerant of human activities. Dispersed recreation and military uses of the area also adversely impact vegetation and habitat over wide, unconcentrated areas. However, most of these dispersed activities are intermittent and/or temporary, and except for small, localized areas of concentrated or recurrent use (e.g., campsites or OHV use areas), both vegetation and wildlife can typically tolerate the level of these activities.

Concern exists over the continuing loss of wildlife habitat, in particular the loss of microphyll woodland habitat which exists in the desert washes that cross much of this cumulative analysis area. Because of the limited forage and cover available in the alluvial flats and uplands between the wash systems, the microphyll woodland habitat is necessary for the success of many species which occur in the area. Microphyll woodland habitat is considered important by the CDFG and a necessary

component of the ecosystem for the continuing success of deer and other sensitive species which utilize the habitat.

Aerial photographs of the general area made available by Glamis Imperial were used to grossly estimate the amount of microphyll woodland habitat within the cumulative impact analysis area. Microphyll woodland habitat is easily distinguished from upland communities on the photographs as dark ribbons of vegetation within lighter areas of sparse vegetation (see Figure 3.16). Limited ground-truthing of the vegetation present in the washes intersecting roads within the cumulative impact assessment area confirmed that the vegetation is comprised of microphyll woodland species similar to those observed in the Project area. An estimate of the total area of microphyll woodland habitat within the cumulative impacts assessment area was based on a visual comparison of the relative density of wash systems external to the Imperial Project area with the density of wash systems within the project area, known to be approximately five (5) percent (Bamberg and Hanne 1995b; Appendix F). Using this technique, it is roughly estimated that approximately four (4) to eight (8) percent of the nearly 200,000 acres (i.e., about 7,680 to 15,360 acres) evaluated in this cumulative impact analysis may be microphyll woodland habitat. Assuming that, on average, a comparable proportion (i.e., four (4) to eight (8)percent) of the microphyll woodland habitat is directly impacted by surface disturbance within the areas of the combined cumulative projects, then a total of approximately 427 to 855 acres of microphyll woodland has been or would be lost within the cumulative assessment area. Because each individual cumulative project would be required to implement appropriate mitigation and compensation measures (such as those contained within a CDFG Stream Alteration Agreement), this cumulative impact on microphyll woodland habitat is below the level of significance.

(Validation of the estimated percentage of microphyll woodland habitat in the cumulative assessment area may be taken from the preliminary results of the vegetation mapping being done for the NECDMP (BLM 1997). Although the NECDMP has not specifically identified "microphyll woodland" (or "tree/shrub," as described in Section 3.5.5) as a vegetation type in its database, the five (5) percent of the Project mine and process area mapped for this EIS/EIR as "microphyll woodland habitat" is included in the approximately 25 percent of the Project mine and process area labeled on the NECDMP maps as "desert dry wash woodland." The remainder of the Project mine and process area is shown on the NECDMP maps as "Sonoran creosote scrub." In the area of the cumulative assessment, the NECDMP maps show that approximately 40 to 50 percent of all of the lands are "desert dry wash woodland." The ratios of these two (2) vegetation/habitat types within the Project mine and process area and in the cumulative assessment area (5:8 and 25:40) are identical.)

The cumulative indirect impacts resulting from the identified cumulative projects are assumed to be proportionately the same as those described for the Project, and would also be expected to be similar with respect to the temporary loss of habitat occurring over the life of the cumulative projects and the permanent loss of habitat after each of the cumulative projects had been closed and the area reclaimed.

Individual projects are required to implement measures to mitigate impacts on desert tortoise and other listed or sensitive plant and animal species, which reduces the potential for both individual and cumulative impacts to wildlife. Because of the implementation of the project-specific mitigation measures and the widely dispersed nature of the cumulative projects, the cumulative effects of the identified cumulative projects and uses on biological resources would be below the level of significance.

5.3.4. Cultural Resources

The area of cumulative analysis for cultural resources, which generally corresponds to the area of cumulative analysis for the other resources, includes the area from the Algodones Sand Dunes in the west to the Colorado River in the east, and the international border with Mexico to the south to an east-west line through the junction of Ogilby Road and Highway 78 to the north. The Quechan Tribe has expressed strong concerns for the cumulative loss of cultural heritage sites within this area and elsewhere in the territory traditionally occupied by Yuman-speaking tribes. In order to assess the cumulative impacts of the Imperial Project and the other cumulative projects within this area of cumulative analysis, two (2) data sources have been utilized. First, consultation conducted with the Quechan Tribe helped identify the impacts of past project to sites of traditional cultural value. Second, an archaeological literature review was conducted to identify cultural resource sites that have been reported for projects in the area of cumulative analysis. The cumulative effects analysis focused on prehistoric archaeological sites and sites of concern to the Quechan Tribe. Non-Indian historic period resources are not considered because the Imperial Project will not have an adverse effect on any such resources and, consequently, would not have a cumulative impact on them. Cumulative effects to resources of traditional cultural concern to the Quechan are discussed first, followed by consideration of cumulative impacts to prehistoric archaeological sites.

Based upon substantial input received from the Quechan Tribe, the cumulative effects of past and current development projects and other land uses on cultural resources located within their traditional territory have been viewed as significant by the Quechan Tribe. Among the projects specifically mentioned by the Quechan Tribe as having contributed to the cumulative loss of cultural resources within the area of cumulative analysis are mining uses (both the modern American Girl Mine Project and the Mesquite Mine, plus "The Potholes" area, located northwest of Laguna Dam; the historic Tumco Mine, located near the Oro Cruz portion of the American Girl Mine Project in the Cargo Muchacho Mountains; and the historic Pilot Knob rock quarry); commercial uses (such as the proposed Mesquite Regional Landfill, the existing Imperial County Picacho Landfill, located on Picacho Road inside the boundaries of the Ft. Yuma Indian Reservation, and land development for agriculture, in general); water projects (specifically the construction of the All American Canal); military uses (General Patton's training exercises in 1940's in the Picacho Basin); transportation/transmission projects (construction of the Arizona Public Service/San Diego Gas and Electric Company Interconnection Project 500 kV electric transmission line, the Southern Pacific Railway, and Interstate Highway 8); and archaeological survey activities for other projects which included artifact collection (Personal Communication, Lorey Cachora, Quechan Tribal member,

November 4, 1997). In addition, the Quechan Tribe has indicated that other activities located outside of the area of cumulative analysis have similarly resulted in, or will result in, the cumulative loss of cultural resources (such as the Marine Corps Air Station Yuma; U.S. Army Yuma Proving Grounds; Luke Air Force Base/Goldwater Bombing Range; the proposed Ward Valley low-level nuclear disposal site, and the development of Yuma and Winterhaven) (Personal Communication, Lorey Cachora, Quechan Tribal member, November 4, 1997).

The Quechan believe that these and other development projects and land use activities have resulted not only in cumulative effects on highly sensitive or sacred resources, but also on such cultural resources as flaking stations, lithic scatters, and pot drops that are generally considered by archaeologists to represent little scientific value after the impacts to these resources have been adequately mitigated. However, the Quechan believe that the most significant impacts to cultural resources have been the destruction or damaged to highly sacred and important mountains, trails, "teaching areas," and geoglyphs. Specific examples of significant impacts offered by Quechan Tribal members include impacts from rock quarrying to Pilot Knob; impacts to key trails, geoglyphs and other resources by the Mesquite Mine and proposed Mesquite Regional Landfill; impacts to a key teaching area located in the Picacho Basin area; and destruction of a portion of the Medicine Trail by the Picacho Mine.

Since the Medicine Trail is one (1) of only two (2) key trails that allow actual and dream travel to Avikwaame, the single most important place in traditional Quechan culture and religion, the proposed impacts from the Imperial Project to the Trail of Dreams in the Project mine and process area, taken together with the recent destruction of a portion of the Medicine Trail in the vicinity of Picacho Peak, would combine to cut-off both key corridors to Avikwaame. More generally, the Quechan Tribe believes that these past and current projects have already destroyed key places of extreme importance to their cultural survival, and that implementation of the Imperial Project would irreversibly add to these affects on their cultural and religious beliefs and practices.

From an archeological perspective, the cumulative effects of the loss of prehistoric cultural resources by the identified cumulative projects would not be considered significant for certain types of resources such as lithic scatters, flaking stations, ceramic scatters, temporary camps, quarry sites and sleeping circles. The reasons for this conclusion are that impacts to sites such as these have generally been adequately mitigated for projects approved since the implementation federal and State environmental and cultural preservation laws; many of the identified cumulative projects are separated by large distances; and these cultural resources are relatively plentiful in the area of cumulative analysis.

The cumulative effects of the loss of other types of prehistoric resources, however, would be considered significant. Specifically, the cumulative effects of these projects on highly sensitive, sacred, or scientifically valuable resources such as sacred mountains, trails, rock art, major habitation sites, cremation and burial areas, and geoglyphs have been adverse when taken together, even if impacts to specific individual projects were mitigated at a project-specific level.

The archeological literature available through the Southeastern Information Center at the Imperial Valley College Museum documents more than twenty (20) cultural resource inventory reports conducted in the area of cumulative analysis since the 1970s pursuant to federal and State environmental laws. Table 5.1 summarizes by report the types and numbers of cultural resources identified by these studies for each project. While it is true that not all cultural resource sites identified by these studies have been impacted by the projects for which they were conducted, numerous other cultural resource sites have been impacted by projects and other land use activities for which cultural resource studies were not conducted or are not available.

The data provided in Table 5.1 support the conclusion that the Imperial Project would increase the cumulative adverse impact on key types of cultural resource sites. Nearly every cultural resource report found one (1) or more of the following cultural resource feature types within the individual project areas of potential effect: geoglyphs, intaglios, petroglyphs, rock rings, trails, or trail shrines. Archaeological recordation of such features is rarely adequate to document their loss, and archaeological methods have not been developed that adequately place many of these types of cultural features in a cultural context that permits their informational and historic values to be recovered. Numerous of these same cultural feature types would be destroyed by the Project. Additionally, the data in Table 5.1 support the perspective of the Quechan that recent projects have resulted in significant cumulative effects upon sites of high value to their contemporary heritage and future cultural survival. Thus, implementation of the Project, taken together with past, current, and reasonably foreseeable future projects would contribute to the already significant cumulative effects to cultural resources.

Table 5.1: List of Cultural Resources Identified Within the Area of Cumulative Analysis Summarized by Project

LIST OF CULTURAL RESOURCES IDENTIFIED WITHIN THE AREA OF CUMULATIVE ANALYSIS SUMMARIZED BY PROJECT			
PROJECT*	**REFERENCE**	**SITE TYPES**	**TOTAL SITES**
Mining Uses			
American Girl Mine Project	Hector 1987	Trails/cairns/historic campsite/mining claims/mineshafts (1), Oregon townsite and mills (1), small settlement/Cude's warehouse/mine (1), miners dugouts/mill/foundations/water tanks and piping (1), mineshafts and loading platforms (1), mineshafts (1), mining structures and reservoirs (1)	7
Mesquite Mine	Mooney-Letteri, no date	Lithic scatters (9), flaking stations (2), rock alignment (1), rock ring/lithic scatter (1), cleared circle (1), flaking station/cleared circle (1), flaking station/ rock ring (1), rock ring (1), lithic scatter/flaking station/rock ring (1)	19
	von Werlhof 1982	Lithic scatters (3), rock ring/cleared circle (1), lithic scatter/rock ring/rock ring w\ cairn (1), lithic scatter/rock ring/quartz smashes (1), lithic scatter/historic trash scatter (1), rock ring/lithic scatter/historic mining claims (1), trail/historic mining (3), historic tent pad/lithic scatter (1), historic tent pad/can scatter (1)	13
	von Werlhof 1983	Flaking stations (20), rock rings (9), flaking stations/rock rings (8), ceramics/flaking stations (2), ceramics/petroglyphs (1), historic-not described (1), lithic scatter/rock alignment (1), geoglyphs/rock rings/lithic scatter (1), habitation/tools/ cairn/flaking station (1), flaking station/ceramics/rock ring/historic (1), geoglyphs/trail/cairns/flaking station/cleared circles/cleared areas/rock alignments (1), ceramics/trail/historics/flaking stations (1), flaking stations/trail/geoglyphs/cairn/spirit break (1)	45
	von Werlhof 1984	Lithic scatter (22), trail (2), rock cairn (3), flaking station (8), ceramic scatter (1), rock alignment (3), rock ring (6), cleared circles (1), historic mining camp (1), military trash scatter (1), rock ring/flaking station (5), lithic scatter/flaking station (2), rock ring/ rock alignment (1), rock ring/lithic scatter (1), geoglyphs/trail (1), geoglyphs/lithic scatter (1), cleared circle/lithic scatter (1), lithic scatter/ceramic scatter (1), trail/rock cairn (1), trail/flaking station (1), trail/ historic mining feature (1), rock rings/cairn (1), rock rings/cleared circles (1), trail/rock rings/ceramic scatters (1), petroglyphs/ceramic scatter (1), rock ring/lithic scatter/flaking station (1), rock ring/lithic scatter/historic mining features (1), lithic scatter/flaking station/cairn/geoglyphs (1), geoglyphs/lithic scatter/rock ring/cairn (1), trail/wagon trail/ceramic scatter/lithic scatter (1), cairns/rock rings/geoglyphs/lithic scatter/rock alignments (1), geoglyphs/cairn/lithic scatter/rock alignment/military encampments and casings (1), trail/rock alignment/flaking stations/ceramic scatter/military tent pads (1), geoglyphs/cleared circles/flaking stations/cairn/cleared areas/rock alignment/flaking stations (1)	77
	Mooney-LeVine and Associates, Inc 1987	Flaking station (1), rock ring (1), rock alignment (1), lithic scatter/flaking stations (6), lithic scatter/rock ring(s) (2), flaking station/rock rings (1), lithic scatter/flaking stations/rock ring(s) (3)	17
	Elling and Schaefer 1988	Flaking stations (33), lithic scatters (27), flaking stations/lithic scatter (2), trails (2), rock rings (2), prehistoric rock wall (1), quarry (1), petroglyph (1)	69
	B.F. Mooney and Associates 1997	Lithic scatter (17), trail segments (4), rock ring (1), lithic scatter/circular rock alignments (2), temporary camp (5), linear rock feature (1)	31
Picacho Mine	ARS 1991	Trail system/spirit break (southwest portion impacted by mining operation). This portion avoided.	1
Pilot Knob Quarry	Schaefer, Jerry 1986	Quarry location is outside the ACEC boundary	0
Miscellaneous	von Werlhof 1981	Geoglyph (1), Trail (1), rock ring (1), trail shrine/pot sherd (1), cairn/cleared circle (1), Historic rock house/lithic scatter/ceramic scatter (1), lithic scatter (1), quartz scatter/cairn	8
Material site/Borrow pit	Dominici 1982	Lithic scatters (1), ceramic scatters (2), historic can scatter (1), historic dump (1)	5

LIST OF CULTURAL RESOURCES IDENTIFIED WITHIN THE AREA OF CUMULATIVE ANALYSIS SUMMARIZED BY PROJECT			
PROJECT[a]	**REFERENCE**	**SITE TYPES**	**TOTAL SITES**
Commercial Uses			
Mesquite Regional Landfill	BLM and ICPBD 1995	Trail segment with associated rock rings, lithics, ceramics (10), rock rings/cleared circles (13), lithic scatters (19), ceramics scatter (1), geoglyph (1)	44
Bechtel Compost Test Site	Schaefer, Jerry 1993	No sites affected	0
Water Conservation Projects			
All American Canal Lining Project	U.S. Bureau of Reclamation, 1994b	Prehistoric sites including lithic scatters, cleared circles, rock alignments, geoglyphs, rock rings, habitation sites, trails, quarry sites, cairns, and petroglyphs. 95 sites within or immediately adjacent to project area near Pilot Knob; 51 sites west of Pilot Knob.	146
Water Reclamation Davis Dam Reach 3	Museum of Northern Arizona 1981	Villages and temporary camps	unknown
Military Uses			
Yuma Training Range (CA)	Woodall et al. 1993	Lithic scatter/flaking stations (1)	1
Recreation Uses			
Pilot Knob Snowbird Camp	Welch, Patrick 1983	Lithic and ceramics scatter (1), lithic scatter/cleared circles (1), lithic scatter (1), trail segment (1)	4
Transmission Lines			
APS/ SDG&E Interconnection Project	Woods 1982	Sacred mountains (2), sacred hills with sacred trail (1), sacred place (1), cremation and burial area (1), gathering area (1), sacred trail (1), sacred trail and rock art (1), multiple use areas (2), and major villages (7)	17
	Pendleton et al. 1986	Lithic scatters (2), cleared circles/lithic scatters (2), cleared areas/lithic scatter (1), lithic scatter/ceramic scatter (1), scatter/trail (1), ceramic scatter/cleared circles/lithic scatter (1), cleared circle, trail/lithic scatter (2), cleared circles/trail/flaking stations (1), cleared circles/trail/flaking stations (1), cleared area/trail/rock features (1), lithic scatter/cleared circles/hearths/trail (1), flaking stations/rock rings/cleared circles/trails (1), possible hearth/rock art/trails/lithic scatter (1), cleared circles/flaking stations/lithic scatters/trail (1), cleared circles/lithic scatter/trails/possible geoglyph (1), trail/lithic scatter/flaking station/cairns (1), cleared circles/trail/flaking stations/hearth/lithic scatter (1), lithic scatter/petroglyphs/milling/ceramic scatter/groundstone (1), trails/flaking stations/rock features/lithic scatters/ceramic scatters (1), cleared circles/trails/possible hearth/rock features/lithic scatters/flaking stations (1), cleared areas/possible hearth/trails/lithic scatter/groundstone/rock art (1), rock alignment/milling/hearths/cleared circles/flaking stations/ceramic scatters (1), ceramic scatters/trail/possible hearths/groundstone/lithic scatter/flaking stations/cleared areas (1), cleared circles/trails/cairn/geoglyphs/ceramic scatters/hearth/lithic scatter (1), ceramic scatters/cleared circles/trails/trail shrine/spirit break/lithic scatter/rock feature/flaking stations (1)	44
Gila Knob 161 kV Transmission Line, Imperial County, California	Western Cultural Resource Management Inc., 1995	Geoglyphs (3), cleared circles with lithics (10), cleared circle with cobble features (1), cleared circle with cobble feature and trail segment (1), lithic procurement/reduction (8), chipped stone quarry (1), WWII tank trucks with lithic scatter (1), historic transmission line (1)	26
IID A-3 Transmission Line	ASM 1997	Ceramic scatter (4)	4
Miscellaneous Projects			
Pilot Knob Class III Survey	Ezzo, J.A. et al. 1993	A total of 41 prehistoric sites including rock art panels (13), lithic concentrations (86), 250+ features including sleeping circles, vision circles, tamped areas, aboriginal intaglios (anthropomorphic, zoomorphic, geometric, and abstract), rock features (cairns, rock piles, rings, geoglyphs, mounds, and mosaics), trail features, and trails	41

[a]Projects indicated in **bold** are those to which mitigation measures for impacts to cultural resources are known to have been applied.

5.3.5. Visual Resources

Each of the identified cumulative projects are located, at least in part, on or adjacent to public lands administered by the BLM within the CDCA. However, except for the immediately adjacent Mesquite Mine and Mesquite Regional Landfill, no more than one of the cumulative assessment projects is visible from any important viewing location at any one time within the cumulative impact study area. Because there is no cumulative increase or combined visual impact from the multiple cumulative projects, the cumulative effects of these projects on visual resources would be below the level of significance.

5.3.6. Noise

The individual cumulative projects generate noise which would be audible outside the respective project areas. However, the respective cumulative project areas are each located at great enough distances (approximately five (5) to ten (10) miles) from the next nearest project or concentrated use that although particularly loud noises (such as blasting) may be audible between those cumulative project areas located closest to each other, other noises should not be audible, and the sound levels would not typically be intrusive. With the implementation of typical project-specific mitigation measures, the identified cumulative projects would not result in a significant cumulative noise impact.

5.3.7. Recreation

There are no unique recreational resources within the cumulative assessment area which are threatened with disruption or elimination through any of the cumulative projects. Dispersed recreational opportunities are those principally available on the public lands located within the cumulative impact area, and there are approximately 4.4 million acres of BLM Class L lands in the CDCA which are also generally available for these dispersed recreation activities. Given the availability of large areas with similar, although not identical, opportunities for dispersed recreation, the cumulative effects on recreation resources would be below the level of significance.

6. OTHER REQUIRED CONSIDERATIONS

6. OTHER REQUIRED CONSIDERATIONS

6.1. Relationship Between Local Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The principal existing land uses in the Project area are mineral exploration, dispersed recreation, and wildlife habitat. Implementation of the Proposed Action would commit approximately 1,609 acres towards a single land use for the anticipated twenty (20)-year life of the Project. Under the Proposed Action, approximately 1,571 acres within the Project mine and process area would be completely fenced. Most wildlife would be precluded from accessing these areas during the operational life of the Project, as would all recreational users.

Upon completion of mining and final reclamation activities, the Project area would be reclaimed and a majority of the previous land uses within the Project area could be re-established. However, the projected period before natural conditions return to an approximate pre-Project status within the Project mine and process area is expected to exceed several decades following completion of final reclamation. The 198-acre East Pit would not be backfilled to the surface and would be reclaimed only to a level that would minimize potential risk to health and safety. Original wildlife habitat, or recreational land uses, would not be re-established in the East Pit area, although the pit would remain accessible for future mineral exploration and development and for selective wildlife habitat.

The Proposed Action would generate net socioeconomic benefits for the local and regional economy over the anticipated twenty (20) years Project life, through the completion of final reclamation. Nearly 300 temporary construction jobs, and 120 full-time jobs, would be created by the Proposed Action. Total annual payroll for the full-time employees would be approximately $7 million. Approximately $48 million in capital would be expended for the Project during 1998. Sales tax on these capital expenditures would amount to approximately $3.72 million. For each year thereafter, average annual capital expenditures would amount to approximately $1.7 million, yielding approximately $0.13 million per year in additional sales tax.

Annual non-capital expenditures are estimated to total $26 million. Property taxes in Imperial County are assessed at approximately 1.1 percent per year of the total assessed value. Depending on the assessed valuation of the Project property, projected property taxes are estimated to range between $250,000 and $600,000 per year. The development of these mineral resources is encouraged by federal land and mineral policies, and development of the Proposed Action would not preclude the long-term use of a majority of the Project area for other land uses.

6.2. Significant Irreversible and Irretrievable Resource Commitments

The topography of the Project mine and process area would be permanently altered by the waste rock stockpiles, heap, and the open East Pit. This would also irreversibly alter the visual character of the Project mine and process area. The land comprising the Project mine and process area would be

irreversibly altered through the excavation of the open pits and the creation of the waste rock stockpiles and heap. Following the completion of reclamation, much of the Project area would be able to support land uses similar to those which existed prior to the Project, although the changes would represent an irreversible commitment to the new landforms.

The extracted ground water and mineral resources represent irretrievable commitments of these local resources to the development of the Proposed Action. In addition, all of the energy, fuels, and other materials (such as processing chemicals) imported to the Project mine and process area which are consumed represent irreversible and irretrievable commitments of resources to the Project.

6.3. Growth-Inducing Effects

The Project would produce few, if any, growth inducing effects. Since the new 92 kV transmission line into the Project mine and process area would be removed following the completion of the Project, the Project would not produce, or require, the extension or expansion of any utilities or public services into the area which would remain to attract or stimulate subsequent developments. Project employment would not be of a size which would stimulate the development of additional growth of housing, schools, or other supporting infrastructure in either Imperial County, California or Yuma County, Arizona. Project expenditures, while substantial, would be spread between California, Arizona and other states, such that no significant economic stimulus to any individual economy would occur.

7. COORDINATION AND CONSULTATION

7. COORDINATION AND CONSULTATION

Several opportunities for coordination and consultation with agencies and the public were provided by the BLM and ICPBD throughout the preparation of this EIS/EIR. The BLM first published a Notice of Intent (NOI) to prepare an EIS for the Imperial Project in the Federal Register on March 24, 1995. A Notice of Preparation (NOP) of an EIR for the Imperial Project was distributed by Imperial County on April 5, 1995. Two (2) public scoping meetings were also held, on April 17 and 18, 1995, to receive public comments, identify concerns, and evaluate viable alternatives. Notices of these public hearings were distributed to approximately 200 news organizations by the BLM. A total of approximately 30 attended these meetings, including eleven (11) members of the public, and a total of sixteen (16) comment letters were received which addressed both specific and general issues regarding the Project. The comments received were used in the development of the scope and content of the Draft EIR for the Imperial Project which was distributed in November, 1996.

A Notice of Availability (NOA) for the November, 1996 Draft EIS/EIR from the BLM was published in the Federal Register, and a Notice of Completion (NOC) for this same document was sent to the California State Clearinghouse by the ICPBD, announcing a 60-day comment period, through December 31, 1996. In addition, notices of the availability of the November, 1996 Draft EIS/EIR were distributed by the BLM on November 1, 1996. On December 26, 1996, the BLM announced that the comment period for the Draft EIS/EIR would be extended through January 31, 1997. On January 27, 1997, the BLM issued a press release which announced the scheduling of a public hearing in El Centro, California on the November, 1996 Draft EIS/EIR, and an extension of the comment period through February 13, 1997. Legal announcements were also published in local newspapers on January 30, 1997.

The public hearing held on February 6, 1997 was attended by approximately 76 people, of whom 25 spoke. At that hearing the BLM announced through a press release that a second public hearing would be held, in La Mesa, California, on February 13, 1997. This public hearing was attended by approximately 78 people, of whom 24 spoke.

On February 21, 1997, the ICPBD issued a Notice of Availability of the Imperial Project November, 1996 Draft EIS/EIR, which was sent to all landowners adjacent to the Imperial Project and published in the local newspaper on February 23, 1997. The Notice of Availability stated that written comments would be received through March 24, 1997.

During the nearly five (5) month comment period for the November, 1996 Draft EIS/EIR, over 425 written comment letters were received by either the BLM or ICPBD regarding the Imperial Project and the November, 1996 Draft EIS/EIR. Based on the agencies' desire to clarify the proposed action and provide greater detail about the proposed project in response to these comments, on June 11, 1997 the BLM and ICPBD jointly announced that they would revise the November, 1996 Draft EIS/EIR for the Imperial Project. The press release was distributed by mail to each party which

either received or commented on the November, 1996 Draft EIS/EIR. The announcement stated that the revised Draft EIS/EIR would incorporate this new information and address the concerns identified by the comments received during the public comment period on the November, 1996 Draft EIS/EIR.

On August 1, 1997, the BLM published in the Federal Register a Notice of Withdrawal of the November, 1996 Draft EIS for the Imperial Project and Notice of Intent to Prepare an EIS for the Imperial Project. This notice stated that although the November, 1996 Draft EIS/EIR was being withdrawn, all comments received on this document would be treated as scoping comments for the revised Draft EIS. New written scoping comments were also solicited, and could be submitted to the BLM through September 2, 1997. Approximately 600 copies of this notice were also distributed by mail, including one to each party which either received, or commented on, the November, 1996 Draft EIS/EIR. Approximately 31 letters were received by the BLM in response to the notices and letters.

Copies of all of the notification documents for the revised Draft EIS/EIR are included in this Draft EIS/EIR in Appendix B. Copies of all of the letters received by the BLM in response to the notices or letters are on file with the BLM and the ICPBD. Additional information regarding the scoping process is presented in Section 1.5 of this EIS/EIR.

Specific additional consultations are being undertaken by the BLM with the USFWS pursuant to Section 7 of the federal Endangered Species Act (see Section 3.5.2) and the SHPO pursuant to Section 106 of the National Historic Preservation Act of 1966 (see Section 4.1.6.1), and by the ICPBD with the CDFG pursuant to the California Endangered Species Act (see Section 3.5.3).

In addition, the American Indian Religious Freedom Act (AIRFA) and the Executive Order 13007 require that local Native American groups be consulted regarding any proposed projects which may affect traditional religious practices, and the BLM has issued internal guidelines which instruct that this consultation should be initiated early in the project review or decision-making process, and be conducted at the highest levels within the BLM jurisdiction responsible for the decision. BLM has initiated this consultation process with the Quechan Tribe regarding the Proposed Action, and the Quechan Tribe has requested, and the BLM has agreed, that members of the tribe be involved in the inventory of cultural resources on the area of the Proposed Action and the development of the treatment plan for the cultural resources which may be either directly or indirectly affected by the Proposed Action. The consultation process is ongoing as of the publication date of this EIS/EIR.

8. LIST OF PREPARERS

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10. GLOSSARY AND LIST OF ACRONYMS

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$\mu g/m^3$	micrograms per cubic meter
AB2588 Program	A common name for the California Air Toxics "Hot Spots" Information and Assessment Act of 1987; references California Assembly Bill (AB) 2588 (aka the Connelly Bill), which established the "Hot Spots" Act.
ACEC	area of critical environmental concern
ACHP	Advisory Council on Historic Preservation
ACOE	U.S. Army Corps of Engineers
afy	acre-feet-per year
AIRFA	American Indian Religious Freedom Act
Amos-Ogilby-East Mesa Basin	A ground water basin of approximately 860 square miles located within the southeastern portion of Imperial County, California
AMSL	above mean sea level
ANFO	A mixture of ammonium nitrate and fuel oil, used as an explosive for blasting purposes
ANP	acid neutralization potential
AP	acid potential
APE	area of potential effect
aquifer	Permeable strata of gravel or sand that serve as conduits for ground water flow
area of the Proposed Action	Area over which all of the Proposed Action would occur, consisting of the Project area and the overbuilt 92 kV/34.5 kV transmission line corridor

ATCC	area of traditional culutral concern
ATF	United States Bureau of Alcohol, Tobacco and Firearms
AWVTE	average weekday vehicle trip ends
B.P.	Before Present
backfill	The process of refilling a mined-out pit with waste rock
BACT	Best Available Control Technology
bajadas	A type of plain found in arid or semi-arid regions, formed by deposition of debris in fan-shaped spreads, commonly as a result of sheet floods
barren solution	Non-precious metals-bearing dilute cyanide solution
bgs	below ground surface
BLM	United States Bureau of Land Management
BMPs	Best Management Practices
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAAQSs	California Ambient Air Quality Standards
Cal-OSHA	California Occupational Safety and Health Act (or Administration)
Cal-EPA	California Environmental Protection Agency
California Desert Protection Act	A 1994 act which, among other things, gave wilderness designation to 69 individual areas of public land within the CDCA

California Regional Water Quality Control Board, Colorado River Basin Region	The California agency responsible for protection of the waters of the state in the Colorado River Basin Region, and for implementing California regulations, through the issuance of Waste Discharge Requirements and National Pollution Discharge Elimination System permits
California Desert Conservation Area	Those public lands located in the California desert which have been identified by Congress in the Federal Land Policy and Management Act of 1976 as a unique area in need of special management by the Bureau of Land Management
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CDHS	California Department of Health Services
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
chipping station	An area which is comprised of a core and several flakes of the same worked material
CIP	carbon-in-pulp

cleared circle	Frequently interpreted as the archaeological remains of temporary shelters which were constructed or bent wooden poles and thatch
CMAGR	Chocolate Mountain Aerial Gunnery Range
CNDDB	California Natural Diversity Data Base
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
Conditional Use Permit	The permit issued by Imperial County which authorizes certain activities in the county as a conditional use within certain zoned areas of the county
cone of depression	The depression in a water table or piezometric surface produced by pumping
County Road S-34	Ogilby Road
CRWQCB	California Regional Water Quality Control Board, Colorado River Basin Region
CSC	California species of concern
CUP	Conditional Use Permit
cyanide	A solid chemical compound (sodium or calcium cyanide) which is dissolved in water to form a solution suitable for the extraction of precious metals from ore by using a leaching process
desert pavement	An area consisting of stones that have been closely packed together to form a uniform, stony surface, generally without vegetation

DWMA	Desert Wildlife Management Area
EA	Environmental Assessment
EIP	Emission Inventory Plan
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMA	Environmental Management Associates, Inc.
endangered species	An animal or plant species which is in danger of extinction throughout all or a significant portion of its range
Environmental Assessment	An analytical document prepared under the National Environmental Policy Act that outlines the potential environmental effects of the Proposed Action and its possible alternatives and leads to a decision to prepare an Environmental Impact Statement or a Finding of No Significant Impact (FONSI)
Environmental Impact Statement	An analytical document prepared under the National Environmental Policy Act that discusses the potential significant impacts to the human environment of a Proposed Action and its possible alternatives which is used by decision makers to weigh the environmental consequences of a potential decision
Environmental Impact Report	A detailed statement prepared under the California Environmental Quality Act describing and analyzing the significant environmental effects of the proposed project and discussing ways to mitigate or avoid the effects
ephemeral	Temporary surface water flows occurring only after precipitation events
ESA	The federal Endangered Species Act of 1973
fanglomerates	A conglomerate formed by the lithifaction of an alluvial fan

FCR	field contact representative
fee land	Land in which the United States government has conveyed the fee simple interest in the surface, and possibly the minerals, into private ownership
FEMA	Federal Emergency Management Agency
FIRM	National Flood Insurance Program Flood Insurance Rate Map
FLPMA	Federal Land Policy and Management Act of 1976
ft/day	feet per day; see hydraulic conductivity
ft/sec	feet per sec; see hydraulic conductivity
ft^2/day	square foot per day; see transmissivity
General Plan	Imperial County General Plan
geoglyph	An arrangement of rocks forming a design
GGX	Glamis Gold Exploration, Inc.
Glamis Imperial	Glamis Imperial Corporation
gpd	gallons per day
gpd/ft^2	gallons per day per square foot; see hydraulic conductivity
gpd/ft	gallons per day per foot; see transmissivity
gpm	gallons per minute
GPS	global positioning system
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HAZMAT	hazardous materials

HCN	hydrogen cyanide
HDPE	high density polyethylene
heap leach pad	A facility lined by impermeable material to collect the leach solutions which are slowly applied to a pile of ore placed in several layers, each approximately 25 feet in height, on top
HMP	Habitat Management Plan
Holocene	An Epoch of the Quaternary period, from the end of the Pleistocene (approximately 10,000 to 11,000 years ago) to the present
hydraulic shovel	A hydraulically powered and operated device used to lift and load large quantities of material
hydraulic conductivity	The quantity of water that would pass through a unit cross-sectional area of a porous material per unit of time under a hydraulic gradient of 1.00 at a specified temperature; generally expressed in units of gallons per square foot per day (equals 1.337×10^{-1} feet per day, or 4.715×10^{-5} centimeters per second)
ICAPCD	Imperial County Air Pollution Control District
ICDHS-DEH	Imperial County Department of Health Services, Division of Environmental Health
ICFGC	Imperial County Fish and Game Commission
ICPBD	Imperial County Planning/Building Department
ICPC	Imperial County Planning Commission
ICPWD	Imperial County Public Works Department
IID	Imperial Irrigation District

Imperial County Planning/Building Department	Local lead agency responsible for implementing the California Surface Mining and Reclamation Act (SMARA) and the California Environmental Quality Act (CEQA), and for approving a Conditional Use Permit (CUP) with accompanying Reclamation Plan subject to conditions
ISDRA	Imperial Sand Dunes Recreational Area
isolates	Less than five (5) artifacts in a 2.5 square meter area
Jurassic	The period of time extending from 195 million years to 135 million years, having a duration of 60 million years
Key Observation Points	Points which were selected as representative of the possible views of a project area
KOPs	Key Observation Points
LCRS	leachate collection and recovery system
leachate	Solution of soluble materials which is formed from percolation of water through strata
leached ore	The ore that has been leached of its precious metals by the leaching solution on the heap leach pad
lithic scatter	Surface scatters of flaked stone tools and manufacturing debris
lode	A mineral deposit that is contained within bedrock, as opposed to a placer deposit
MCAS	Marine Corps Air Station
MCL	maximum contaminant limit

migratory bird	Any bird, whatever its origin and whether or not raised in captivity, which belongs to species listed in Section 10.13 of the Migratory Bird Treaty Act (16 USC 701-718h), or which is a mutation or a hybrid of any such species, including any part, nest, or egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of such bird or part, nest, or egg thereof; all birds are considered migratory with the exception of: (a) the English sparrow; (b) starlings; and (c) barnyard pigeons
mine and process area	See Project mine and process area
Miocene	The epoch of the Tertiary period between the Oligocene and the Pliocene epochs
MMPA	Mining and Mineral Policy Act of 1970
MOA	Memorandum of Agreement
MSHA	Mine Safety and Health Administration
NAAQSs	National Ambient Air Quality Standards
National Environmental Policy Act	The act that established the procedures by which the environmental consequences of a decision by agencies of the federal government are analyzed and documented prior to the decision being made
NDOW	Nevada Department of Wildlife
NECDMP	Northern and Eastern Colorado Desert Coordinated Management Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOA	Notice of Availability

NOC	Notice of Completion
NOI	Notice of Intent
NOP	Notice of Preparation
NORM	naturally occurring radioactive materials
NO_x	oxides of nitrogen
NP	neutralization potential
NPDES	National Pollutant Discharge Elimination System Permit
NRC	National Research Council
NRHP	National Register of Historic Places
NURE	national uranium resource evaluation
NVD	night vision device
NVG	night vision goggle
NWS	National Weather Service
O_3	ozone
OHV	off-highway vehicle
OHWM	ordinary high water mark
open pit	The area from which ore and waste rock are removed
OSHA	Occupational Safety and Health Administration

Overbuilding — Overbuilding consists of installing new, taller, wooden poles adjacent to existing wooden poles; installing higher voltage conductors near the top of new poles; moving the existing lower voltage conductors from existing poles to below the higher voltage conductors on new poles; then removing the existing poles

patented land — A mining claim for which the United States government has conveyed the fee simple interest in the surface and minerals into private ownership

Pb — lead

PCR — project contact person

placer — A deposit of mineral resources which is formed by an alluvial process and contained within alluvial material

Plan of Operation — A document prepared by the proponent of any mining development of locatable minerals and filed with the Bureau of Land Management, which presents a detailed discussion of the proposed project

Pleistocene — The first epoch of the Quaternary Period in the Cenozoic Era, characterized by the spreading and recession of continental ice sheets, and the appearance of modern man

Pliocene — The last epoch of the Tertiary Period in the Cenozoic Era, during which many modern plants and animals developed

PM — particulate matter

PM_{10} — particulate matter that is less than 10 microns in diameter

$PM_{2.5}$ — particulate matter that is less than 2.5 microns in diameter

PMP — probable maximum precipitation

POO — Plan of Operation

porosity	The percentage of the bulk volume of rock, sediment, or soil that is occupied by interstitial spaces
pot drops	Pottery concentrations where individual pots were accidentally or intentionally broken and abandoned; pot drops are often found along trails or near water sources
ppbv	parts per billion by volume
ppm	parts per million
ppmv	parts per million by volume
Precambrian	An era of geological time preceding the Paleozoic era, before 570 million years ago; approximately 90 percent of all geological time occurred within this period
pregnant solution	A precious metals-bearing cyanide solution which contains sufficient quantities of gold and silver that can be sent to the precious metal recovery plant to remove the precious metals from the solution
Project	Imperial Project
Project ancillary area	Used to describe the Project area excluding the Project mine and process area, which contains the ground water production wells, a buried water pipeline, and a new 92 kV/13.2 kV electrical transmission line, all located adjacent to Indian Pass Road, and two (2) relocated portions of Indian Pass Road.
Project mine and process area	Used to describe the Project area excluding the Project ancillary area, which contains all of the open pits, waste rock stockpiles, soil stockpiles, ephemeral wash diversion channels, administration office and maintenance facility area, heap leach facility, precious metal recovery plant, an electric substation, and internal roads and electrical distribution lines.
Project area	Includes the Project mine and process area and the Project ancillary area

Proposed Action	The action proposed to be undertaken, consisting of two (2) general components: the Imperial Project, a proposed open-pit, heap-leach, precious metal mine; and the "overbuilding" of a sixteen (16)-mile section of an existing 34.5 kV utility electrical transmission line with 92 kV conductors to deliver the necessary electrical power to the Imperial Project
PSD	Prevention of Significant Deterioration
public land	Any land and interest in land owned by the United States within the states and administered by the Secretary of the Interior through the Bureau of Land Management, without regard to how the United States acquired ownership, except: (1) lands located on the Outer Continental Shelf; and (2) lands held for the benefit of Indians, Aleuts, and Eskimos
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
Quaternary	The second period of the Cenozoic era covering the past two (2) to three (3) million years
R.S. 2477	Revised Statute 2477
RACM	Reasonably Available Control Measures
RCPG	Regional Comprehensive Plan and Guide
Reclamation Plan	A document submitted to the Bureau of Land Management and Imperial County, the respective federal and local lead agencies, that details the specific measures to be taken by the project proponent to reclaim the project lands during mining operations and after mining and leaching have been completed
ROCs	reactive organic chemicals
ROD	Record of Decision
ROGs	reactive organic gases

ROM	run-of-mine
ROW	right-of-way
Run-of-Mine	Describes ore which is not crushed prior to processing
Salton Trough	A landward extension of the East Pacific Rise, a zone of rifting and crustal spreading which created the Gulf of California
SBB&M	San Bernardino Baseline & Meridian
SCAG	Southern California Association of Governments
SEDAB	Southeast Desert Air Basin
sensitive species	Plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations; a plant or animal species recognized as being depleted, rare, threatened, or endangered and recognized as requiring special management to prevent placement on federal or state lists
sensitive receptor	In general, areas of habitation where the intrusion of noise has the potential to adversely impact the occupancy, use or enjoyment of the environment; sensitive receptors include, but are not limited to, residences, schools, hospitals, parks and office buildings
SHPO	State Historic Preservation Officer
significant environmental impact	A substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance
SIP	State Implementation Plan
SMARA	Surface Mining and Reclamation Act
SO_2	sulfur dioxide
SO_4	sulfate

soil stockpile	Locations within the mine and process area where excavated soils are stockpiled for future revegetation purposes
solution ditch	An above-ground, trough-shaped structure that is lined with an impermeable material and engineered to convey cyanide solution from the heap leach pad to the solution pond; none would be used for the Imperial Project
solution pond	A bowl-shaped structure that is lined with an impermeable material and engineered to contain cyanide solution from the heap leach pad for processing in the precious metals recovery plant and subsequent recirculation to the heap leach pad
SO_x	sulfur oxides
SPLP	synthetic precipitation leaching procedure
SSAB	Salton Sea Air Basin
storativity	The volume of water that an aquifer releases from storage per unit area of aquifer per unit decline in the component of hydraulic head normal to that surface. Storativity is also referred to as storage coefficient and is dimensionless.
Storm Water NPDES	California Storm Water National Pollution Discharge Elimination System
Surface Mining and Reclamation Act	An act passed by the California legislature which prescribes the reclamation of mined lands within the state of California and directs the Counties within the state to review and approve a Reclamation Plan of each mining operation as part of the County's Conditional Use Permit process
swell factor	Term used to describe condition whereby broken rock occupies a greater volume than the same weight of solid rock
SWPPP	Storm Water Pollution Prevention Plan
T/E	threatened or endangered
TCP	Traditional Cultural Property

TDS	total dissolved solids
TPY	tons per year
transmissivity	The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient; generally expressed in units of gallons per foot per day (equals 1.337×10^{-1} square foot per day)
TSP	total suspended particulates
TTLC	Total Threshold Concentration Limit
U.S. Bureau of Land Management	The agency of the United States Government, under the Department of the Interior, responsible for administering the public lands of the United States
UBC	Uniform Building Code
unnecessary or undue	surface disturbance greater than what would normally result when an activity is being accomplished by a prudent operator in usual, customary, and proficient operations of similar character and taking into consideration the effects of operations on other resources and land uses, including those resources used outside the area of operations
Unpatented	A mining claim for which the United States government has not conveyed the fee simple interest in the surface and minerals into private ownership
USBR	United States Bureau of Reclamation
USC	United States Code
USDI	United States Department of Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

USMC	United States Marine Corps
vadose zone	The unsaturated zone above the water table
VFR	visual flight rule
Visual Resource Management System	The Bureau of Land Management system used to identify visual values; establish objectives for managing these values; and provide information to evaluate the visual effects of proposed projects
VOCs	volatile organic compounds
VRM	visual resource management
WAPA	Western Area Power Authority
waste rock stockpile	Location within the mine and process area where excavated waste rock from the pits is stockpiled
Waste Discharge Requirements	A permit issued by the California Regional Water Quality Control Board which governs the construction, operation and closure of the heap leach pad, process ponds and the precious metals recovery plant, and any other discharges of waste to land
water table	The upper surface of a water-saturated zone of rock or porous media
WDRs	Waste Discharge Requirements
WSA	wilderness study area

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APPENDIX A GLAMIS IMPERIAL CORPORATION IMPERIAL PROJECT RECLAMATION PLAN

GLAMIS IMPERIAL CORPORATION
IMPERIAL PROJECT

RECLAMATION PLAN

Submitted to:

Bureau of Land Management
California Desert District
El Centro Resource Area

and

Imperial County Planning/Building Department

Revised August 1997

Submitted by:

Glamis Imperial Corporation
Winterhaven, California

GLAMIS IMPERIAL CORPORATION
IMPERIAL PROJECT

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Submitted to:

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California Desert District
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Revised August 1997

Submitted by:

Glamis Imperial Corporation
Winterhaven, California

Prepared with the assistance of:

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100 West Grove Street, Suite 100
Reno, Nevada 89509
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26050 E. Jamison Circle
Aurora, Colorado 80016

GLAMIS IMPERIAL CORPORATION
IMPERIAL PROJECT
RECLAMATION PLAN

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GLAMIS IMPERIAL CORPORATION
IMPERIAL PROJECT
RECLAMATION PLAN

1. INTRODUCTION

The Imperial Project (Project) will be an open-pit, heap-leach, precious metal mine located in eastern Imperial County approximately 45 miles northeast of El Centro, California (see Figures 1 and 2). The Project will: mine gold and silver ore and waste rock at a rate of up to 200,000 tons per day; construct and operate facilities to administer the operation; maintain all mining and related equipment; process the ore and stockpile waste rock; develop and produce ground water for use in processing operations and dust control; conduct geological survey activities; implement wildlife impact reduction measures; and perform reclamation. The Project has been designed to meet the anticipated permit requirements of the various federal, state and local agencies which regulate area mining. This Reclamation Plan (Plan) is prepared in compliance with Imperial County requirements (FORM A175.PDS, 8/93) and the California Surface Mining and Reclamation Act of 1975 (SMARA), as amended. Reclamation activities will also be conducted in accordance with the regulations found at 43 CFR 3809.1-3(d) and 14 CCR 3500.

A joint Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) is being prepared pursuant to the National Environmental Policy Act and California Environmental Quality Act, respectively, to evaluate the environmental effects of the Project (SCH #95041025). Pursuant to the provisions of SMARA, information contained in an EIR for a project may be used to satisfy the requirements of SMARA and its implementing regulations if that information is referenced in the project's reclamation plan and is attached to the plan when forwarded to the state for review. Accordingly, the joint EIS/EIR for the Project is hereby incorporated by reference, and Chapter 2 (Alternatives Including the Proposed Action), Chapter 3 (Affected Environment), Chapter 4 (Environmental Consequences and Mitigation Measures), Chapter 5 (Cumulative Effects), and all Appendices are specifically referenced as containing information supplemental to that contained in this Reclamation Plan which may satisfy the requirements of SMARA and its implementing regulations.

The Project will consist of the following components: three (3) open pits, identified as the West Pit, East Pit and Singer Pit; two (2) waste rock stockpiles; two (2) topsoil stockpile sites; one (1) administration office and maintenance facility area; one (1) heap leach facility; one (1) precious metal recovery plant and other related facilities; a system of roads internal to the Project mine and process area which will connect the various facility components; five (5) diversion channels; one (1) electrical power substation and associated internal transmission lines; the relocation of approximately 6,000-feet of Indian Pass Road, which would be moved approximately 1,000 feet to the west of its current location to allow continued public access to areas northeast of the Project (see Figure 3); one (1) well field, consisting of up to four (4) production wells designed to produce ground water at a peak rate of approximately 1,000 gallons per minute (gpm) and peak yield of approximately 1,200 acre feet per year (afy); a water pipeline to convey water from the wells to the Project mine and process area; construction of

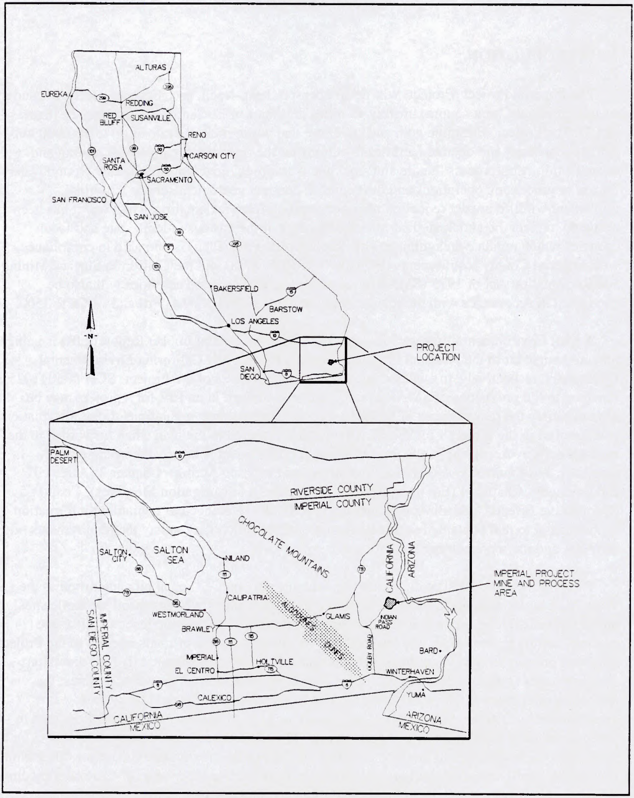


Figure 1: Imperial Project General Location Map

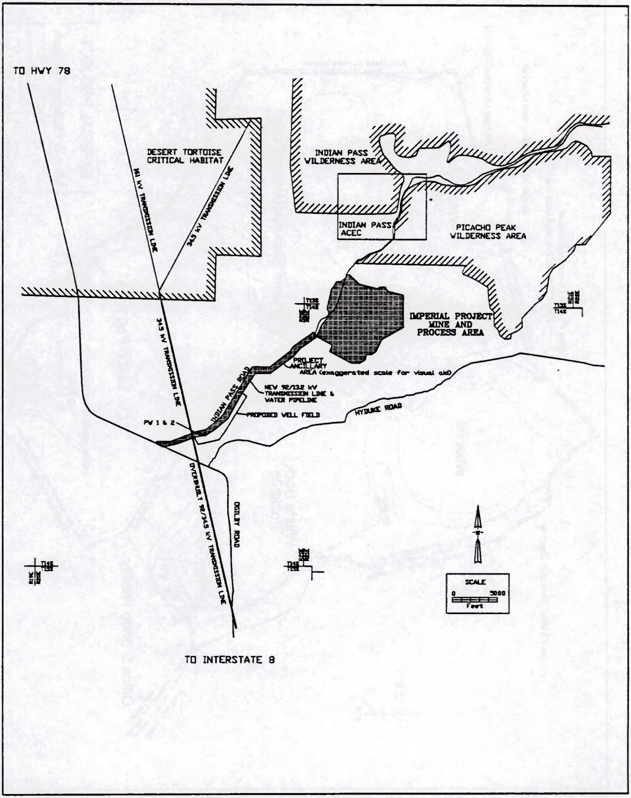


Figure 2: Imperial Project Facility Locations

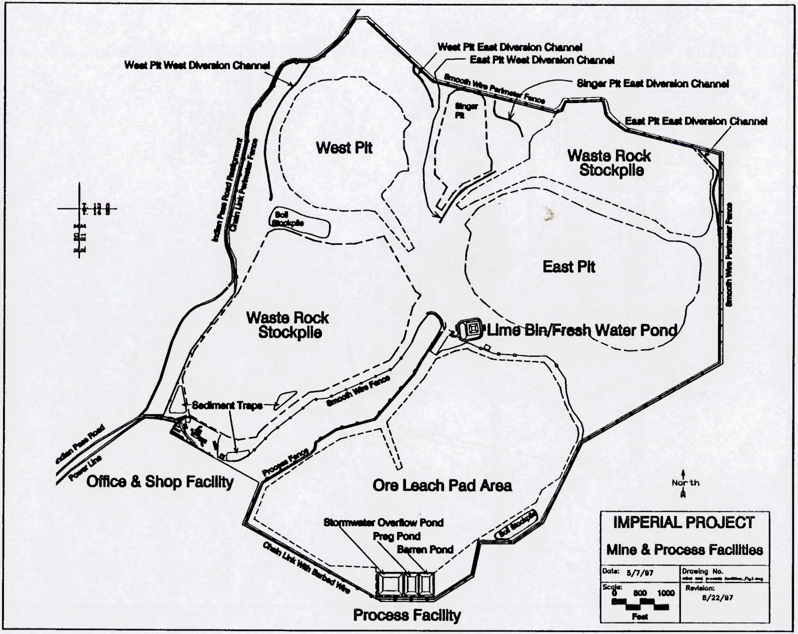


Figure 3: Imperial Project Mine and Process Area Facilities

approximately 3.66 miles of new 92 kV transmission line from the rebuilt section of 92 kV line near the intersection of Indian Pass and Ogilby Road to the project mine and process area, and realignment of the intersection of Indian Pass Road and Ogilby Road (see Figure 2).

Glamis Imperial Corporation (Glamis Imperial), sister company to Chemgold, Inc., operator of the Picacho Mine (Picacho), is submitting this Reclamation Plan to the BLM and the Imperial County Planning/Building Department in conformance with federal and state regulations. The Project was formerly known as the Indian Rose Project, and current exploration activities are being performed under Imperial County Reclamation Plan No. 149-91, as well as an exploration Plan of Operations (POO) with the BLM.

The reclamation techniques and methods in this Reclamation Plan are based on successful revegetation programs at Glamis Imperial's sister mine, Chemgold's Picacho Mine, and other nearby mines in this area of the California Desert. Resultant revegetation treatments may be the same as have been used at Picacho and American Girl Mines, but will be designed for environmental conditions specific to the Project. These methods are appropriate to the dry climate and harsh environmental factors at the proposed mine site. These methods use topographic grading and the seeding or transplanting of local, native species to reestablish a productive ecosystem of plants and animals. As necessary, the seeding and revegetation plan may be refined over a period of time as further revegetation tests dictate. The Plan can be updated with BLM assistance, and updates will be reviewed and approved by BLM and Imperial County prior to final decommissioning and reclamation of the Project area.

2. OWNER, OPERATOR AND AGENT

2.1 Applicant

Glamis Imperial Corporation is a wholly-owned subsidiary of Glamis Gold Inc., located in Reno, Nevada. Glamis Gold, Inc. is wholly-owned by Glamis Gold, Ltd., a fully reporting, publicly-owned U.S. corporation listed on the New York and Toronto Stock Exchanges. Glamis Gold, Ltd., is located in Vancouver, B.C., Canada.

The Glamis Imperial Corporation address is:

Glamis Imperial Corporation
P.O. Box 1177
Winterhaven, CA 92283
(760) 337-1891

Mr. Steve Baumann, Imperial Project General Manager, is the Glamis Imperial employee responsible for Project development.

2.2 Name of Mineral Property

Imperial Project (previous and current activities conducted under the name "Indian Rose Project," County Reclamation Plan No. 149-91).

2.3 Property Owner or Owner of Surface Rights

The Project is located on public lands administered by the BLM.

2.4 Owners of Mineral Rights

Glamis Imperial Corporation
P.O. Box 1177
Winterhaven, CA 92283
(760) 337-1891

2.5 Lessee

Not applicable.

2.6 Operator

Glamis Imperial Corporation
P.O. Box 1177
Winterhaven, CA 92283
(760) 337-1891

2.7 Agent of Process

C.T. Corporation System
818 West 7th Street
Los Angeles, CA 90017
(213) 227-0763
Agent: Ms. Barbara Cannizzo

3. LOCATION

3.1 Legal Description

The Project is located in eastern Imperial County, California, approximately 45 miles northeast of El Centro, California and twenty (20) miles northwest of Yuma, Arizona (Figure 1). The Project is located on public lands administered by the BLM within Sections 31, 32 and 33, Township 13 South, Range 21 East, and Sections 4, 5, 6, 7 and 8, Township 14 South, Range 21 East, San Bernardino Baseline & Meridian (SBB&M).

3.2 Size of lands that will be affected by mining operation

The Project area consists of a Project mine and process area and a Project ancillary area.

Project Mine and Process Area

The Project mine and process area contains all of the open pits, waste rock stockpiles, topsoil stockpiles, administration office and maintenance facility area, heap leach facility, precious metal recovery plant and other facilities, electrical power substation, and internal roads.

Project Ancillary Area

The Project ancillary area consists of those Project facilities located outside of the Project mine and process area, including the ground water production wells and water pipeline, the new 92 kV transmission line, and the relocated portions of Indian Pass Road.

Since the "overbuilt" 92 kV transmission line will be utility-owned, it is not included as part of the Project area. The overbuilding construction activities will re-disturb up to 22 acres of land, most of which was previously disturbed during original powerline construction. As shown in Table 1, the fenced Project mine and process area (see Figure 2) consists of approximately 1,571 acres, of which approximately 1,302 acres will be disturbed. An additional 38 acres will be disturbed in the Project ancillary area, for a total of approximately 1,340 acres of disturbance for the entire Project area. The boundary of the Project mine and process area is presented in Figure 2.

3.3 Access route to the operation site

Main access to the Project area is by traveling eight (8) miles west from Winterhaven, California via Interstate 8 to the Ogilby Road exit, and thence thirteen (13) miles north on Ogilby Road to Indian Pass Road, a county-maintained gravel road. The Project mine and

process area is located approximately five (5) miles northeast of that intersection, along Indian Pass Road (see Figure 2).

3.4 Mineral commodity to be mined

Precious metals (mainly gold).

3.5 General geologic description of the area

The Project is located in southeast California within the Colorado Desert portion of the Basin and Range physiographic province along the southwestern flank of the Chocolate Mountains. The Project mine and process area occupies a broad, relatively flat and dissected drainage basin southwest of the Chocolate Mountains. The southwestern flank of the Chocolate Mountains consists largely of Jurassic age gneisses and schists overlain by Tertiary age basalts, fanglomerates, and Quaternary age alluvium. A thin veneer of flood basalt caps the gravel and forms distinct ridges and land forms. About 95 percent of the Project mine and process area consists of older cemented alluvium in upland areas, which vary in thickness from ten (10) to 1,000 feet, and narrow strips of recent (Quaternary age) alluvium in active ephemeral stream channels. Gneissic bedrock units outcrop on about fifteen (15) acres in the northern portion of the site. Beneath the Quaternary age alluvium, the geologic section consists of Jurassic schist and gneiss units unconformably overlain by Tertiary andesite and basalts.

3.6 Detailed description of the geology of the actual site in which surface mining is to be conducted

The Project area lies near the center of the mining district formed by the Picacho, Mesquite and American Girl mines and is approximately ten (10) miles from each of those currently active heap leach gold mines.

Gold mineralization occurs in Jurassic age granitic gneisses in the upper plate of the Chocolate Mountains thrust. The thrust has an estimated throw of 48 kilometers to the northeast, moving gneisses and intrusive rocks over green schist facies schists. The Project deposit's geology is similar to that observed at the nearby Picacho and Mesquite gold deposits.

Table 1: Estimate of Disturbed, Reclaimed and Undisturbed Acres for the Imperial Project Area

COMPONENT			DISTURBED ACRES	RECLAIMED ACRES		UNDISTURBED ACRES
				ON SITE[a]	OFF SITE[b]	
PROJECT AREA						
Project Mine and Process Area						
Mining Area	1	West Pit	110	110		
	2	East Pit	198	33	165	
	3	Singer Pit	33	33		
	4	Associated Areas of Disturbance	38	38		
Pad Facilities	5	Leach Pad	334	334		
	6	Process Area	24	24		
	7	Lime Bin Area and Fresh Water Pond	9	9		
Waste Rock Stockpiles	8	East Waste Rock Stockpile	135	135		
	9	South Waste Rock Stockpile	232	232		
Soil Stockpiles	10	West Soil Stockpile	20	20		
	11	East Soil Stockpile	10	10		
Support Facilities	12	Office/Maintenance/Parking/ Power Facilities	21	21		
	13	Haul and Ancillary Roads	94	94		
	14	Drainage Diversions	44	44		
Project Mine and Process Area Subtotal:			**1,302**	**1,137**	**165**	**269**
Project Mine and Process Area Total:			**1,302**	**1,302**		**269**
TOTAL PROJECT MINE AND PROCESS AREA ACREAGE:			**1,571**			
Ancillary Area						
Ancillary	15	County Road Realignment	7	7		
	16	Powerline/Water Pipeline	27	27		
	17	Water Wells and Access Roads	4	4		
Project Ancillary Area Subtotal:			**38**	**38**	**0**	**0**
Project Ancillary Area Total:			**38**	**38**		**0**
TOTAL PROJECT ANCILLARY AREA ACREAGE:			**38**			
PROJECT AREA ACREAGE SUBTOTAL:			**1,340**	**1,175**	**165**	**269**
PROJECT AREA ACREAGE TOTAL[c]:			**1,340**	**1,340**		**269**
TOTAL PROJECT AREA ACREAGE:			**1,609**			

[a] Reclamation methods would be applied to all disturbed acres except East Pit slopes (165 acres), which would naturally revegetate.
[b] As compensation for those lands not reclaimed within the Project mine and process area, Glamis Imperial would reclaim under an MOA developed with the BLM up to 165 acres of lands located off site which were previously disturbed.
[c] In addition to the acres to be disturbed within the Project Area, up to approximately 22 acres would be disturbed outside the Project area during rebuilding of the existing 34.5 kV transmission line to a 34.5 kV/92 kV transmission line.

Three (3) closely-spaced ore bodies have been identified which are located along a west-northwesterly trend. The ore bodies will be developed within the West, Singer and East Pits. The deposits are composed of sub-tabular blocks averaging 200 to 300 feet thick. Mineralization is structurally controlled by the intersection of low-angle and high-angle shear zones. Gold is associated with limonite and hematite in highly sheared and brecciated gneiss, and minor hydrothermal alteration is present as a weak form of sericitization. Oxidation extends to depths in excess of 1,500 feet below ground surface, and to date, no pyrite or other sulfide minerals have been observed in the ore or waste rock, other than oxidized remnants of pyrite in some drill cuttings.

3.7 Brief description of the environmental setting of the site and the surrounding areas. Existing land use, soil, vegetation, ground water elevation and surface water characteristics

The Project area is situated on nearly flat terrain south of the Chocolate Mountains, at elevations ranging between 760 and 925 feet above mean sea level (AMSL). The Project area is transected by ephemeral washes which drain from the northeast to the southwest, terminating by infiltration against the Algodones Dunes. Although the region has a long mining history which dates back to the 1780's, previous mining activities in the Project area itself were limited to minor dry placer exploration operations conducted in the 1970's. The proposed Singer Pit area was the site of some placer activities, and numerous shallow pits exist there in both alluvium and bedrock. No other former mining operations have existed within the Project area. Present and pre-mining land use of the Project mine and process area includes mineral-related activities, recreation (rock-hounding and off-highway vehicle use), hunting and wildlife habitat.

Soils on the Project mine and process area are 0 to 18 inches thick and poorly developed, consisting of gravelly or coarse sands, with most of the area covered by upland flats or desert pavement. Vegetation in the Project mine and process area is sparse, with plants more abundant along washes. Typical upland vegetation is a shrub/scrub type consisting of inciensio, burrobush, creosote bush, teddy-bear cholla, and ocotillo; washes have additional tree species of desert ironwood and palo verde, and other shrub species of sweetbush and desert lavender. This vegetation provides the foraging and cover habitat component necessary for wildlife species.

Piezometer holes drilled in the projected locations of the bottoms of the East Pit and the West Pit have encountered ground water at depths of 88 feet AMSL and 211 feet AMSL, respectively, which is above the anticipated floor of the respective pits. As such, it is possible that ground water will enter each of the pits during mining operations. However, tests have indicated that the hydraulic conductivity of the bedrock formation is very low, and ground water inflow has been estimated at only 1.5 gpm for the West Pit and 0.7 gpm for the East

Pit. Should ground water be encountered in the pits, it can be utilized, where possible, in dust control operations, or can be collected and used in process operations.

Average annual precipitation in the Project area is approximately 4.5 inches (WESTEC Report No. 10893, October 1994). All surface drainages in the area are ephemeral, with flows occurring only during and immediately following major precipitation events. Precipitation tends to occur in fairly short, intense storm events in the summer and frontal storms in the winter.

4. PROPOSED SURFACE MINING OPERATION

4.1 Proposed starting date of operation; estimated life of operation, and duration of first phase

Project life is projected up to twenty (20) years. Mining activities will commence in 1998, and operations will terminate by approximately the year 2017.

4.2 Operation will be:

The operation will be continuous and performed up to 24 hours per day, seven (7) days per week, up to 365 days per year.

4.3 Operation will be:

The operation will mine gold and silver ore and waste rock at a rate of up to 200,000 tons per day. Operations will continue for up to twenty (20) years.

4.4 Total anticipated production; minerals; waste retained on site; waste disposed off-site; maximum anticipated depth

The deposits will be mined using conventional open pit mining techniques. Up to 150 million tons of ore would be mined and deposited on the leach pad where the precious metals would be leached and up to 300 million tons of waste rock will be deposited at the waste rock stockpiles or the mined-out portions of the open pits under the Proposed action. Overburden, ranging from 40 to 350 feet in thickness and consisting of alluvial gravels (both unconsolidated and cemented) and minor amounts of volcanic rock, covers portions of the ore bodies. This material constitutes a large percentage of the waste rock materials. No mining waste is to be disposed of off-site.

The configuration of the three (3) pits is defined by the precious metals content, depth of mineralization, metallurgy and other geologic, geotechnical and economic factors. Current estimates of pit dimensions to develop the ore zones are shown in Table 2.

Table 2: Proposed Surface Dimensions, Depth from the Surface, and Pit Floor Elevations of the Open Pits

PIT	PROJECTED PIT DIMENSIONS			PIT FLOOR ELEVATION (ft AMSL)
	LENGTH (ft)	WIDTH (ft)	DEPTH (ft)	
West Pit	2,700	2,700	760	-60
East Pit	4,700	2,700	880	-60
Singer Pit	1,000	2,000	400	460

5. MINING METHOD

5.1 Describe nature of processing and explain disposal of tailings or waste

Ore will be processed using conventional heap leach technologies. No milling will be performed, and no tailings will be generated by the Project operations. The heap leach process has become the industry standard, is well understood, and is being safely and successfully utilized at Glamis Imperial's sister operation, the Picacho Mine, located eight (8) miles east of the Project mine and process area; by other companies at two (2) nearby mines; and at numerous other mines located throughout the western United States. The process involves stacking the ore on a synthetically-lined, impervious pad, and wetting the surface of the ore heap with an alkaline solution containing low levels of cyanide. This solution percolates through the ore, producing a soluble, precious metal-cyanide complex which drains through the heap to the liner and then flows within a pipe drainage system to the pregnant solution storage pond. The precious-metal bearing pregnant solution is then pumped to the processing facility where the precious metals are extracted from the solution by way of a carbon adsorption process. The resultant barren solution then flows to the barren solution storage pond before being pumped back to the leach pad for reuse. The loaded carbon is stripped of its precious metals, which are then electroplated onto steel wool or stainless steel cathodes. The gold/silver bearing cathode material is shipped offsite for final refinement.

The leach pad, collection channels, and process ponds will be designed as lined, zero-discharge facilities with leak detection systems, in conformance with the California Regional Water Quality Control Board - Colorado River Basin (CRWQCB-CRBR) requirements. A draft Notice of Waste Discharge Requirements #97-040 has been issued for the Project described in the DEIS/EIR.

Mining of the ore zones will employ conventional open pit mining techniques. The mining sequence will be phased, with the West Pit mined first, followed by mining of the Singer Pit and East Pit. Waste rock and overburden will be placed on the waste rock stockpiles adjacent to the pits or, as mining proceeds from one pit to the next, into previously mined-out pits. The West Pit and Singer Pit will be backfilled.

Two (2) waste rock stockpiles are proposed; one (1) to be located south of the West Pit and one (1) north of the East Pit. Up to 300 million tons of waste rock, consisting primarily of alluvium overburden, will be mined and placed into the waste rock stockpiles and mined out portions of the West and Singer Pits.

The waste rock stockpile located south of the West Pit will be constructed first, followed by construction of the stockpile north of the East Pit. These waste rock stockpiles are designed to be constructed in successive 50-foot to 100-foot lifts, to a maximum height of 300 feet, and are engineered to have overall 2 horizontal to 1 vertical (2H:1V) ultimate

slopes. The stockpiles are to be developed by end-dumping, with the active face of each lift lying at the angle of repose of the waste rock (approx. 1.5H:1V).

5.2 Cyanide or toxic materials used in operations

A list of the chemicals that will be used at the Project, and the estimated annual consumptions, quantities stored on-site and the type of secondary containment for each is provided in Table 3. All chemicals, except as noted below, will be stored in closed, weather-proof containers in secured, open-air storage areas.

All cyanide will be stored within a triple contained process area, surrounded by a security fence. Sodium cyanide will be added to the barren solution after leaving the barren solution pond in order to maintain the desired 200 to 350 parts per million (ppm) cyanide concentration in the barren solution applied to the heap. Safe and efficient cyanide handling practices are currently utilized at Glamis Imperial's sister operation, the Picacho Mine, and similar systems will be installed at the Project. No liquid cyanide transportation is planned.

The sodium hydroxide and hydrochloric acid will be stored in a secured, hazardous materials storage yards near the process facility (see Table 3). Acids would never be stored near cyanide. Calcium oxide (lime) will be stored in a silo on the north end of the heap leach loading ramp. Anti-scalants will be stored adjacent to the process ponds. The mine chemicals/blasting agents and associated explosives will be stored in magazines according to U.S. Bureau of Alcohol, Tobacco and Firearms (ATF), and Mine Safety and Health Administration (MSHA), safety standards. All chemicals will be stored in conformance with local, state and federal regulations and company safety policies.

5.3 Quantity of water to be used, source of water, method of conveyance to the mine site, and the quantity, quality and method of disposal of used and/or surplus water

Peak water consumption for the project is expected to be approximately 1,000 gallons per minute (gpm), averaging 1,200 acre feet per year (afy). Water used in the heap leach process would be recycled back onto the leach pad. Evaporation losses from this process would be minimized through the use of drip irrigation emitters and the absence of open flow ditch channels. Approximately 75% of the total project water consumption would be for the heap leach process including capillary retention of water within the heap leach pad. Dust suppression, reclamation activities, domestic use, and construction would account for the remaining 25% of Project water consumption.

Glamis Imperial is currently proposing to develop a ground water well field to provide the Project water requirements . The proposed well field is located within the Project ancillary area, near the intersection of the existing electric transmission line and Indian Pass Road. It extends adjacent to Indian Pass road 1.5 miles to the northeast (see Figure 2). The Project

water requirements will require the drilling and installation of two (2) to four (4) water wells. As shown on Figure 2, an initial test well (PW-1) has been drilled, approximately four (4) miles south of the Project mine and process area, within the proposed well field.

Test well PW-1, will be converted to a production well with issuance of the CUP and Groundwater Extraction Permit. A second production well (PW-2) is planned in the proposed well field area, approximately 1,000 ft northeast of well PW-1. The precise number and location of the additional wells, if necessary, will be dependent on the results of the testing and performance of each preceding well. However, all required additional wells would be drilled within the proposed well field. A buried pipeline will run from the well field to an above-ground fresh water storage pond and distribution tanks constructed within the Project mine and process area (see Figure 2).

5.4 Describe phases of mining and concurrent reclamation including time schedule for concurrent activities

The mining sequence will be phased, with the West Pit mined first, followed by mining of the Singer Pit and East Pit. It is anticipated that waste rock and overburden may be placed on waste rock stockpiles adjacent to the pits or, as mining proceeds from one pit to the next, into the previously mined-out West and Singer pits. The West Pit and Singer Pit will be backfilled. Reclamation of the Project area will be initiated when individual components are no longer required for mine operations or when facilities are decommissioned and site closure begins. Removal of facilities, rough grading, scarifying, and reclamation activities may occur at any time during the Project operational life.

Concurrent reclamation activities will begin with construction of the diversion channels, and the stabilization and erosion control of the topsoil stockpiles during the construction phase of the mine and leach pad complexes. During initial construction, diversion channels will be reclaimed with soil, vegetation and trees removed from disturbed wash areas. As operations progress, areas no longer needed for mining activities become available for concurrent reclamation. Concurrent reclamation would focus on the stable diversion of surface water, as well as the stabilization of new or upgraded access roads, side and final cut-and-fill slopes, and final waste rock stockpiles. The interim reclamation of topsoil stockpiles generally consists of grading for stabilization and allowing natural germination from seeds present in the soil. Topsoil stockpiles will be placed in field determined locations away from washes that will provide protection from water erosion (see Figure 3). The sandy and stony nature of the soils will prevent significant wind erosion after placement. Large trees and shrubs will either be removed and appropriate specimens transplanted before soil stripping, or buried in topsoil stockpiles and waste rock stockpiles. Small shrubs and surface

Table 3: Storage, Location, Consumption, and Containment of Facility Chemicals

CHEMICAL LISTING				
CHEMICAL NAME	**ANNUAL CONSUMPTION**	**ON-SITE STORAGE**	**LOCATIONS STORED**	**SECONDARY CONTAINMENT**
Heap Leach Processing Chemicals				
Sodium Cyanide	1,750 tons	40 tons	• Adjacent to Processing Plant in steel o-bins or solution tanks, in secured yard	• Secured yard • Lined concrete slab
Lime (CaO)	16,500 tons	400 tons	• North end of leach pad in bulk silos	• none
Sodium Hydroxide	150 tons	20 tons	• Barren Pond • Secured Hazardous Materials Storage yard	• Lined concrete slab
Hydrochloric Acid	212 tons	6,500 gals	• Secured Hazardous Materials Storage yard in bulk tank	• Lined concrete slab
Polymaleic Acid (anti-scalant)	150 tons	6,500 gals	• Near processing facility ponds in bulk tanks. • Drain to pond.	• Lined concrete slab
Activated Carbon	130 tons	50,000 lbs	• Sacks, in secured yard	• None
Calcium Hypochlorite	1,000 lbs	5000 lbs	• Drums in secured hazardous materials yard	• Lined
Soda Ash	2,000 lbs	1,000 lbs	• Sacks, in secured yard	• Concrete slab
Sodium Nitrate (nitre)	1,000 lbs	500 lbs	• Sacks, in secured yard	• Concrete slab
Silicon Dioxide (sand)	1,000 lbs	500 lbs	• Sacks in secured yard	• Concrete slab
Borax (5 mol)	2,000 lbs	1,000 lbs	• Sacks, in secured yard	• Concrete slab
Mine Chemicals/Explosives				
Ammonium Nitrate	7,500 tons	400 tons	• Bulk Silos	• None
Water Gel Explosives	130 tons	25 tons	• Magazine	• None
Cast Boosters	130 tons	2 tons	• Magazine	• None
Other Explosives	20 tons	2 tons	• Magazine	• None
Maintenance Facility Chemicals				
Acetylene	12,000 ft^3	2,000 ft^3	• Miscellaneous locations	• None
Oxygen	12,000 ft^3	5,000 ft^3	• Miscellaneous locations	• None
Diesel Fuel	4,000,000 gal	100,000 gal	• Above-ground storage tanks	• Concrete containment
Unleaded Gasoline	40,000 gal	2,000 gal	• Above-ground storage tanks	• Concrete containment
Automatic Transmission Fluid	5,000 gal	4,900 gal	• Maintenance Facility	• Concrete pad
Ethylene Glycol	2,000 gal	1,300 gal	• Maintenance Facility	• Concrete pad
Solvents	1,000 gal	200 gal	• Maintenance Facility	• Concrete pad
Hydraulic Oil	10,000 gal	4,900 gal	• Maintenance Facility	• Concrete pad
Gear Oil	5,000 gal	4,900 gal	• Maintenance Facility	• Concrete pad
Greases	1,000 gal	200 gal	• Maintenance Facility	• Concrete pad
Motor Oil	20,000 gal	4,900 gal	• Maintenance Facility	• Concrete pad
Laboratory Chemicals				
Miscellaneous Lab Chemicals	2,000 lbs	250 lbs	• Various small containers in Laboratory	• Concrete slab

litter including seeds will be incorporated into the topsoil stockpiles. Historic exploration roads may be reclaimed concurrent with mining operations when it is determined that the roads are outside the influence of further geologic survey activities or mining operations.

5.5 Map

See Figure 2 and Figure 3.

6. RECLAMATION PLAN

The reclamation plan addresses all surface disturbance created by the Project. In general, the reclamation plan includes measures for: protecting wildlife and the public; minimizing erosion and mass failure potential; demolishing structures and neutralizing process components; regrading selected side and cut-and-fill slopes; revegetation; and, where feasible, providing the resumption of pre-mining land uses. The post-mining reclamation goals at the Project are to reclaim the site to a stable, functioning landscape unit/ecosystem to allow for similar land uses, including wildlife habitat and recreation, as currently exist, consistent with the applicable reclamation standards of the California Code of Regulations, Article 9, Title 14 (Reclamation Standards), and the surface management regulations under the general mining law found in the Code of Federal Regulations, Title 43, Group 3800. The final land forms of the mine site can not be reclaimed to the original contours. Thus the goal of the Plan is not to restore and revegetate to the original land form, but to a natural state that blends in with the existing undisturbed terrain.

Glamis Imperial's sister company, Chemgold, has recently conducted revegetation testing programs at the nearby Picacho Mine and has information on reclamation testing at three (3) additional desert mining locations in California. The most recent monitoring reports for revegetation testing at the Picacho Mine are included as Attachment A and Attachment B. This experience and information forms the basis for several procedures proposed here. The natural revegetation that has already occurred on previously disturbed mined areas in this desert region also served as a basis for determining the plant species and topographic features necessary for successful reclamation. The testing programs and subsequent observations have been used also as a basis for reclamation techniques, seed sources and plant species selection, and topographic modification. Resultant revegetation treatments may be the same as have been used at Picacho and American Girl Mines, but will be designed for environmental conditions specific to the Project. Techniques and alternatives for reclamation of altered terrain left after mining and ore processing are also discussed in this plan.

The reclamation effort consists of different methods to be applied, as appropriate, to reclaim different types of surface disturbance (see Section 6.6). These methods are; the construction and reclamation of diversion channels, demolition of structures and removal of facilities, rinsing and neutralization of residual leach solution in the solution ponds and heap, backfilling of selected pit(s), the construction of a boulder barricade around the East Pit for public safety and to exclude vehicle access, design and construction of stable slopes, rough regrading, ripping to loosen soil, construction of catchment basins, topsoiling, surface preparation through fine grading, tree and cactus transplantation; reseeding and revegetation; or natural revegetation.

6.1 Indicate by overlay of map, or by color or symbol on map, those areas to be covered by the reclamation plan and acreage

Table 4 provides a list of the areas disturbed and the reclamation methods to be applied to each of these areas. Figure 4 shows the projected final contours of the Project mine and process area prior to reclamation. Figure 5 shows areas of the Project mine and process area subject to the specified reclamation methods. Figure 6 shows the project components and the acreage to be disturbed and reclaimed. Figure 7 shows the final topography after contouring and grading.

6.2 Describe the ultimate physical condition of the site and specify proposed use(s) or potential uses of the land after reclamation

The present and pre-mining land uses of the Project area and vicinity include mineral-related activities, recreation (rock-hounding, camping, and off-highway vehicle use), hunting and wildlife habitat. The post-mining land uses are expected to be similar, including rock hounding, camping, hunting, off-highway vehicle use, and wildlife habitat.

The post-mining goals and objectives for reclamation of the Project area are to return the land to a similar land use (i.e., rock-hounding, hunting, camping, wildlife habitat), to ensure public safety, and to prevent unnecessary or undue degradation of the federal lands during operations until reclamation is successful. More specifically, the objectives are to:

- Establish stable topographic surfaces and drainage conditions that are compatible with the surrounding landscape and serve to control erosion.
- Regrade waste rock stockpiles and the leach pad slopes to no greater than 2H:1V and install catchment basins to promote revegetation.
- Backfilling the West Pit and Singer Pit.
- Provide a technical review of the groundwater flows and levels encountered in the East Pit. If the results of the review indicate a pit lake may form, backfill that portion of the floor of the East Pit to above the level of any projected pit lake.
- Establish, on waste rock stockpiles, haul roads, pit bottoms and facilities, soil conditions conducive to a stable plant community through grading and reapplication of suitable growth material containing seeds.

Table 4: Reclamation Methods to be Applied to Areas Disturbed Within the Mine and Process Area

MINE FACILITY COMPONENT		RECLAMATION METHODS TO BE APPLIED									
		STRUCTURE DEMOLITION FACILITY REMOVAL	NEUTRALIZATION	VEHICLE ACCESS EXCLUSION	SLOPE STABILIZATION	REGRADING	SURFACE PREPARATION	BACKFILL	NATURAL VEGETATION	REVEGETATION	TRANSPLANT VEGETATION
Mine and Process Area											
Pits	West & Singer Pits (see also Waste Rock Stockpiles)					X	X	X		X	
	East Pit-Bottom			X			X			X	
	East Pit-Slopes			X	X				X		
Process Facilities	Heap Leach Pad-Top		X			X	X			X	
	Heap Leach Pad-Slopes		X		X	X	X			X	X
	Process Facility Area (Solution Ponds and Process Facilities)	X	X			X	X			X	
	Lime Bin Area and Fresh Water Pond	X				X	X			X	
Waste Rock Stockpiles	Waste Rock Stockpiles-Top					X	X			X	
	Waste Rock Stockpiles-Slopes				X	X	X			X	X
Topsoil Stockpiles	Soil Stockpiles Sites					X	X			X	
Support Facilities	Office/Maintenance/Parking/Emergency Power Area	X				X	X			X	
	Haul and Maintenance Roads					X	X			X	
	Drainage Diversions					X	X			X	X
Ancillary Area											
County Road Realignment-Temporary						X	X			X	
Powerline, Water Wells		X				X	X			X	
Pipeline Route						X	X			X	

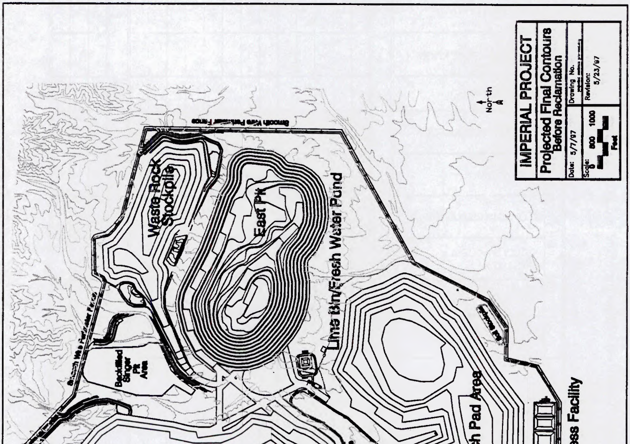


Figure 4: Imperial Project Mine and Process Area - Projected Final Contours Prior to Reclamation

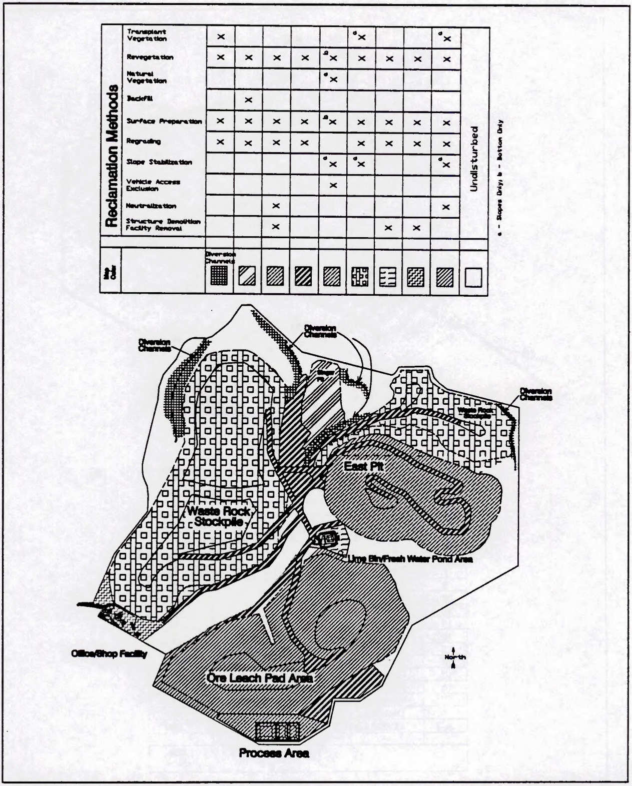
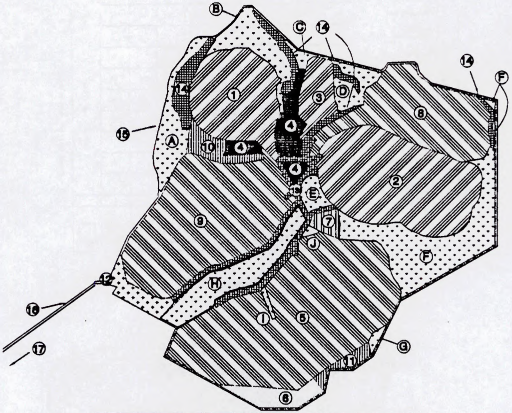


Figure 5: Reclamation Methods to be Applied to Areas Disturbed Within the Mine and Process Area



Area	Description	Acreage
1	West Pit	110
2	East Pit	198
3	Singer Pit	33
4	Associated Areas of Disturbance	38
5	Pad	334
6	Process Facility	24
7	Lime Bin & Fresh Water Pond	9
8	East Waste Rock Stockpile	135
9	South Waste Rock Stockpile	232
10	West Soil Stockpile	20
11	East Soil Stockpile	10
12	Office/Maintenance/Parking/Power	21
13	Haul & Maintenance Roads	94
14	Drainage Diversions	44
15	County Road Realignment	7
16	Powerline & Water Pipeline	27
17	Wells Access Roads & Fenced Area	4
	Disturbed SubTotal	1,340
A-J	Undisturbed SubTotal	269
	Total	1,609

Figure 6: Imperial Project Components and Acreage to be Disturbed and Reclaimed

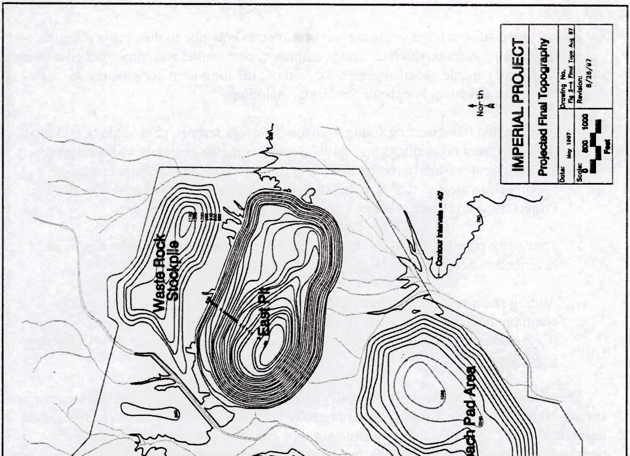


Figure 7: Imperial Project Final Topography After Contour and Grading

- Revegetate disturbed areas using native plant species endemic to the area in order to establish a long-term productive biotic community compatible with proposed post-mining land uses and capable of self-regeneration without the long-term dependency on maintenance, soil amendments, or fertilizers, including;

  - Planting and transplanting young ironwood (*Olneya tesota*), palo verde (*Cercidium floridum*) trees or seedlings and shrub species along the channels which divert the throughgoing washes to reestablish the microphyll woodland habitat in acreage roughly equivalent to that acreage currently found along these channels within the Project mine and process area;

  - Transplant ocotillo, barrel cactus and species of cholla into catchment basins as described in Section 6.6h) [**Catchment Basin Design**];

  - Adding seeds of the California Native Plant Society (CNPS)-listed, but locally common, endemic fairy duster (*Calliandra eriophylla*) and winged forget-me-not (*Cryptantha holoptera*) to the revegetation seed mix (see Section 6.6h) [**Collecting Seed Sources**]).

The species listed below will potentially be in the seed mix, either as banked seeds or as species which have typically germinated or can be expected from seed mixture. Species are designated either as wash plants (w), upland (u) or common to both (b); deer browse perennial species are denoted as (db), and deer will graze herbaceous perennials and annuals in season:

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Trees		
Cercidium floridum	palo verde	w, db
Olneya tesota	desert ironwood	w, db
Shrubs		
Acacia greggii	catsclaw	w
Ambrosia dumosa	burrobush	b
Atriplex canescens	four-wing saltbush	b, db
Bebbia juncea	sweetbush	w
Calliandra eriophylla	fairy duster	w, db
Ditaxis lanceolata	lance-leaved ditaxis	w
Ditaxis neomexicana	ditaxis	w
Encelia farinosa	inciensio	b, db
Hibiscus denudatus	rose mallow	b
Horsfordia newberryi	yellow felt-plant	w

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Hymenoclea salsola	cheesebush	w, db
Hyptis emoryi	desert lavender	w
Krameria erecta	purple heather	w
Krameria grayi	desert ratany	u
Larrea tridentata	creosote bush	b
Lycium andersonii	box thorn	w, db
Porophyllum gracile	odora	u
Psorothamnus schottii	indigo bush	u
Simmondsia chinensis	jojoba	w, db
Stephanomeria pauciflora	wire lettuce	b
Grasses		
Achnatherum speciosum	desert needlegrass	u
Aristida purpurea	triple-awned grass	u
Bromus madritensis	red brome	b
Erioneuron pulchellum	fluff grass	b
Muhlenbergia porteri	muhly	w
Pleuraphis rigida	big galleta grass	w
Schismus barbatus	Mediterranean grass	b
Herbs		
Allionia incarnata	windmill	u
Amsinckia tessellata	fiddleneck	b
Atrichoseris platyphylla	gravel-ghost	w
Brassica tournefortii	mustard	b
Calycoseris wrightii	yellow tack-stem	b
Camissonia boothii	booth's evening primrose	b
Camissonia claviformis	club evening primrose	b
Camissonia refracta	narrow-leaved primrose	b
Chaenactis carphoclinia	pebble pincushion	u
Chaenactis stevioides	chaenactis	u
Chamaesyce albomarginata	white-fringed sandmat	b
Chamaesyce polycarpa	prostrate spurge	b
Chorizanthe brevicornu	brittle spine-flower	u
Chorizanthe corrugata	corrugata	u
Chorizanthe rigida	spiny chorizanthe	u
Cryptantha angustifolia	narrowleaved forget-me-not	b
Cryptantha barbigera	bearded forget-me-not	b
Cryptantha circumscissa	western forget-me-not	u
Cryptantha dumetorum	flexuous forget-me-not	u
Cryptantha holoptera	winged cryptantha	w

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Cryptantha maritima	white-haired forget-me-not	w
Cryptantha micrantha	Nevada forget-me-not	b
Cryptantha nevadensis	Nevada forget-me-not	b
Dalea mollissima	idigo	u
Descuriana pinnata	yellow tansy mustard	b
Eremalche rotundifolia	desert five-spot	u
Eriastrum diffusum	eriastrum	b
Eriogonum inflatum	desert trumpet	u
Eriogonum pusillum	yellow turbin	u
Eriogonum thomasii	thomas buckwheat	u
Erodium texanum	desert heron's bill	b
Eschscholtzia minutiflora	little gold poppy	b
Euphorbia eriantha	beetle spurge	b
Fagonia laevis	smooth-stemmed fagonia	u
Geraea canescens	desert sunflower	u
Gilia latifolia	sticky snakeweed	b
Guillenia lasiophylla	langloisia	b
Gutierrezia microcephala	peppergrass	u
Langloisia setosissima	calico	u
Lepidium lasiocarpum	lotus	b
Loeseliastrum schottii	small-flowered blazing	u
Lotus strigosus	ghost flower	b
Mentzelia albicaulis	small-flowered blazing	b
Mentzelia involucrata	sand blazing star	b
Mohavea confertifolia	ghost flower	u
Mirabilis bigelovii	four o'clock	b
Monoptilon bellioides	desert star	b
Nama demissum	purple mat	u
Nemacladus	thread plant	b
Nemacladus rubescens	rigid-stemmed thread	b
Oligomeris linifolia	linear-leaved cambess	w
Pectocarya platycarpa	broad-nutted comb-bur	u
Perityle emoryi	rock daisy	u
Phacelia crenulata	notch-leaved phacelia	u
Phacelia fremontii	fremont phacelia	b
Plantago ovata	plantain	b
Psathyrotes ramosissima	turtleback	b
Salvia columbariae	chia	u
Streptanthella	jewelflower	b
Trichoptilium incisum	yellow-head	b
Trixis californica	trixis	b

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Uropappus lindleyi	silver puffs	w
Cactus (transplanted as stems or joints)		
Ferocactus cylindraceus	barrel cactus	u
Fouquieria splendens	Ocotillo	b
Opuntia acanthocarpa	buckhorn cholla	b
Opuntia echinocarpa	golden cholla	b
Opuntia basilaris	beavertail cactus	b
Opuntia bigelovii	teddy-bear cholla	b
Opuntia ramosissima	pencil cactus	u

- Provide public safety through slope stabilization and barricading of the East Pit with a continuous wall consisting of boulders that are four (4) feet in diameter stacked a minimum of eight (8) feet high.

- Minimize the outward regrading or reshaping of slopes to reduce further impacts to undisturbed wildlife habitat.

- Enhance the long-term visual character of the reclaimed area by producing rounded slopes and undulating topographic relief on the waste rock stockpiles and leach pad to blend into the backdrop of the surrounding terrain.

For specific details on the site's ultimate physical condition, see Section 6.6.

6.3 Describe relationship of the interim uses other than mining and the ultimate physical condition to: a) zoning regulations and b) general plan and various elements

Bureau of Land Management

Section 302 of the Federal Land Policy and Management Act of 1976 (FLPMA), and BLM regulations for surface management of public land being mined under the general mining law (43 CFR 3809), recognize the statutory right of mineral claim holders such as Glamis Imperial to explore for, and develop, federal mineral resources, and encourages such development.

43 CFR 3809.0-6 states:

"Consistent with Section 2 of the Mining and Mineral Policy Act of 1970 and Section 102(a) (7), (8), and (12) of the Federal Land Policy and Management Act, it is

the policy of the Department of Interior to encourage the development of Federal mineral resources and reclamation of disturbed lands. Under the mining laws a person has a statutory right, consistent with Departmental regulations, to go upon the open (unappropriated and unreserved) Federal lands for the purpose of mineral prospecting, exploration, development, extraction and other uses reasonably incident thereto. This statutory right carries with it the responsibility to assure that operations include adequate and responsible measures to prevent unnecessary or undue degradation of the Federal lands and to provide for reasonable reclamation."

43 CFR 3809.05(k) defines "unnecessary or undue degradation" as:

"Surface disturbance greater than what would normally result when an activity is being accomplished by a prudent operator in usual, customary, and proficient operations of similar character and taking into consideration the effects of operations on other resources and land uses, including those resources and uses outside the area of operations. Failure to initiate and complete reasonable mitigation measures, including reclamation of disturbed areas or creation of a nuisance, may constitute unnecessary or undue degradation. Failure to comply with applicable environmental protection statutes and regulations thereunder will constitute unnecessary or undue degradation. Where specific statutory authority requires the attainment of a stated level of protection or reclamation, such as in the California Desert Conservation Area, Wild and Scenic Rivers, areas designated as part of the National Wilderness System administered by the Bureau of Land Management and other such areas that level of protection shall be met."

43 CFR 3809.05(j) defines "reclamation" as:

"taking such reasonable measures as will prevent unnecessary or undue degradation of the Federal lands, including reshaping land disturbed by operations to an appropriate contour and, where necessary, revegetating disturbed area as to provide diverse vegetative cover. Reclamation may not be required where the retention of a stable highwall or other mine workings is needed to preserve evidence of mineralization."

Thus, these federal regulations require the BLM to review proposed operations to ensure that: (1) adequate provisions are included to prevent unnecessary or undue degradation of public lands; (2) measures are included to provide for reasonable reclamation; and (3) the proposed operations comply with other applicable federal, state and local laws and regulations. Glamis Imperial has submitted to the BLM a proposed Plan of Operations (POO) as required under these regulations.

The Project would be located within the California Desert Conservation Area (CDCA), has been identified by Congress in the Federal Land Policy ad Management Act of 1976 (FLPMA) as a unique area in need of special management by the BLM. Use of the lands and

natural resources within the CDCA are guided by the 1980 CDCA Plan (as amended). All of the Project area would be located within multiple use Class L - Limited Use, which is the second-most restrictive of the four (4) classifications. Management of Class L areas is "oriented towards giving priority protection to sensitive natural, scenic, ecological, and cultural resources while placing limitations on other uses that may conflict with or degrade these values" (USDI, 1980). The multiple use guidelines adopted for implementing the CDCA Plan in Class L lands recognize that locatable mineral operations are non-discretionary, but state that the development of locatable minerals on Class L lands will be limited to activities necessary to achieve extraction with minimum environmental impact, using best available mitigation technology and most effective feasible reclamation practices. The Plan states that, in this class, BLM will review plans of operations "for potential impacts on sensitive resources identified on lands in this class", and that, "Mitigation, subject to technical and economic feasibility, will be required" (P.19).

<u>Imperial County, California</u>

The Project is located entirely on federal public lands managed by the BLM. As such, Imperial County land use zoning requirement and conditional use permits for land uses on such public lands are not strictly applicable. However, the Project is required to comply with the California Surface Mining and Reclamation Act of 1975 (SMARA) and the applicable California Department of Conservation regulations in Title 14, CCR, as implemented by the County of Imperial through the Planning/Building Department with respect to approval of a reclamation plan. The reclamation plan must be in accordance with SMARA, the county's surface mining ordinance, and state minimum reclamation standards set forth in 14 CCR 3700-3713, relating to wildlife habitat; geotechnical requirements; erosion and sediment control; resoiling and revegetation; and other reclamation issues. Approval of the Project's proposed Reclamation Plan must be obtained from Imperial County prior to commencement of construction, and the County may adopt conditions for the approval of the Reclamation Plan.

Imperial County's Groundwater Management Ordinance also requires that a permit be obtained prior to commencing the drilling of the groundwater production wells proposed by Glamis Imperial from the County Public Works Director, who shall determine whether sufficient groundwater is available for the proposed use based on the projected use of groundwater by the project in accordance with Section 56614.01(b) of the Ordinance.

The Project area is currently zoned "S-Open Space" by Imperial County. The proposed Project design is consistent with the objectives and concerns of the Imperial County General Plan, zoning regulations, and the CDCA Plan for public lands.

Major recreation activities include off-highway vehicle use, camping, and hunting will not be impeded in the areas surrounding the project area. Access to the Chocolate Mountains will not be interrupted by the mining operation.

6.4 Notarized statement that all owners of a possessory interest in the land have been notified of the proposed uses or potential uses identified in Item 8.5.3.

See Attachment C.

6.5 Describe soil condition and proposed soil salvage plan

Most of the Project mine and process area (approximately 95 percent) is covered by desert pavement or shallow, skeletal soil on slopes and uplands. Project mine and process area soils are poorly-developed gravely sands, and little useful soil is present for later reclamation and revegetation. Nevertheless, surface soils will be salvaged from all areas, such as washes, where soil textures are suitable. It is anticipated that approximately 112,200 cubic yards of soil will be able to be salvaged by collecting soils from those identified areas to the greatest depth practicable (generally 12 to 18 inches). During construction of diversion channels, soils will be removed from existing washes and immediately relocated to diversion channels. In addition, salvaged topsoil will be stockpiled at two (2) proposed site locations (see Figure 3) for later use during reclamation activities. The topsoil stockpiles will be clearly identified with signs to assure that the material is not misidentified as waste rock material. Topsoil stockpiles will be placed in field determined locations away from washes, providing protection from water erosion. The sandy and stony nature of the soils will prevent significant wind erosion after placement. Large trees and shrubs will either be removed and appropriate specimens transplanted before soil stripping or buried in topsoil stock piles and waste rock stockpiles. Small shrubs and surface litter including seeds will be incorporated into the topsoil stockpiles. The heap leach material will be reclaimed in place, and not transported or used as a separate plant growth medium.

The interim reclamation of the topsoil stockpiles may require grading to control erosion and allow seeds in the surface layer to germinate. Erosion control methods will re-route any storm flows around the stockpiles to minimize erosion.

After topsoil stockpile material has been removed from the stockpile areas for replacement on other sites within the Project mine and process area, the residual surface may be loosened, if necessary, to alleviate compaction and seeded with the native seed mixture for the area.

6.6 Describe the methods, their sequence and timing to be used in bringing the reclamation of the land to its end state. Indicate on map or on diagrams as necessary. Include discussion of the pertinent items listed below:

The goal of the reclamation program is to reestablish a stable, self-sufficient ecosystem on the disturbed areas of the Project mine and process area. Routine irrigation of reclaimed areas at other climatically similar mines has proven to be unsuccessful in the long term. Therefore, that approach will not be utilized on the Imperial Project. Instead, initial limited or periodic irrigation is planned only for transplants within the Plan. In addition, locally-collected and native plant species seeds will be sown as part of the reclamation process. These native and locally-adapted plants are more likely to germinate in a specific site and survive, thereby enhancing the chances for long-term, successful vegetation. Native shrubs, trees, and cactus will also be transplanted to diversion wash banks and into catchment basins within the reclaimed areas (see Section 6.6h) [**Seeding, Planting and Transplanting**]) for list of potential species).

Reclamation of the diversion channels will be done concurrently with diversion channel construction. Reclamation of the remainder of the disturbed areas will be initiated when individual components are no longer required for mine operations or when facilities are decommissioned and site closure begins. Removal of facilities, rough grading, and scarifying activities may occur at any time during the Project life. Anticipated concurrent reclamation activities are discussed in Section 5.4. When ore reserves are exhausted, mining operations would stop and closure and post-closure reclamation activities commence. Leaching operations would stop after uneconomic recovery rates are reached. Due to the length of time required to complete leach cycles, the heap leaching activities will remain active after mining activities have stopped. Therefore, reclamation of the open pits, some ancillary facilities and closure activities will occur in advance of leach pad reclamation and closure.

It is estimated that the closure phase of reclamation will take one (1) to three (3) years to complete following cessation of leaching. Post-closure monitoring of revegetation success and erosion control procedures are expected to account for an additional five (5) years.

a) Backfilling and grading

As previously discussed, mining of the ore zones will employ conventional open pit techniques. The mining sequence will be phased, with the West Pit mined first, the Singer Pit second, followed by mining of the East Pit.

Waste rock and overburden would be placed on waste rock stockpiles adjacent to the pits or, as mining proceeds into the previously mined-out West and Singer pits. The West and Singer Pits will be backfilled. Subsequent backfill may be necessary to raise the floor

of the East Pit to a level higher than the level of any pit lake which may be eventually predicted to form from the inflow of ground water.

During active mining, reclamation in and around the open pits will be limited to controlling erosion of the haul roads and slopes. Upon the completion of mining and any appropriate or necessary backfilling, the remaining open pits will be reclaimed by regrading (and revegetating) the haul roads and floors and leaving the slopes in a stable condition. Stable angles of the pit highwalls will be determined by an engineering analysis which will be completed after one full year of mining in each of the West and East pits. Results of this study will then be incorporated into the subsequent open pit designs.

All disturbed areas except the pit slopes will be regraded and revegetated, when no longer required for mine operations. This reclamation will create undulating land forms that are stable, do not allow for any pooling or ponding, and blend with the surrounding undisturbed topography. Final regrading on the tops and slopes of the waste rock stockpiles and the leach pad, the bottoms of the open pits, and haul roads will be conducted to minimize erosion potential and facilitate the establishment of post-mining vegetation. Sharp edges will be rounded and straight lines altered to provide contours which are visually and functionally compatible with the surrounding terrain (see Figure 7). In addition, regrading will entail the construction of catchment basins to facilitate the revegetation of the disturbed areas (see Section 6.6h) [**Catchment Basin Design**]). Regrading of other areas disturbed by facilities, roads, and the areas adjacent to diversions will be fine graded to enhance moisture for reclamation and revegetation.

b) Stabilization of slopes

Stable topographic surface and drainage conditions will be established to control erosion, prevent sedimentation, and are blend with the surrounding landscape. Slopes will depend on the type of material, erodability, and the practical considerations of the mining process. Overall pit slopes will range from 0.8H:1V (40 degrees) to 1H:1.2V (50 degrees). The final slopes of the waste rock stockpiles and leach pad will not exceed 2H:1V (30 degrees). All other disturbed areas will be reclaimed at grade.

Pit wall slopes will be constructed during mining at angles consistent with long-term stability. Results of an engineering study conducted by WESTEC (WESTEC Report No. 1454.FN2, January 1997) indicates that the slope of the ultimate pit walls would be 40 to 50 degrees to provide the required factor of safety for long-term slope stability. Each pit is to be developed in separate phases, which allows verification of slope stability parameters. In addition, after one full year of mining in each of the East and West pits a slope stability analysis will be performed. Results of the study will be incorporated into open pit designs. Due to the limited depth, size, and life of the Singer Pit (less than 6 months mining), no additional slope engineering analysis is planned for that pit. Instead,

the Singer Pit mining will utilize the West Pit analysis. Pit walls will have safety benches at regular vertical intervals to contain minor rock spills. Pit wall slopes may increase if actual mining conditions and geotechnical factors indicate that pit wall integrity could sustain steeper slopes. After closure, pit highwalls remaining in areas not utilized for waste rock stockpiling will be left in a stable configuration, subject to natural processes, and barricaded with large boulders around the rim of the pit(s) to prevent vehicular access and discourage pedestrian access. The barricade shall consist of boulders averaging approximately four (4) feet in diameter, which shall be stacked into a continuous wall no less than eight (8) feet high. This "wall" shall be set back from the edge of the pit by no less than 100 feet. In addition the uppermost ten (10) feet of the pit itself shall slope no greater than 2h:1v, and shall terminate at its lower side into a horizontal bench no less than 10 feet wide. A typical cross section of the final configuration of a pit wall, including boulder barricade, is shown in Figure 8.

c) Stabilization of permanent waste dumps, tailings, etc.

No tailings will be generated by the Project.

A typical cross section of the final configuration for a waste rock stockpile is shown in Figure 9. Overall final slope grades will not exceed 2H:1V. Upon final mine closure, the tops and slopes of the waste rock stockpiles will be rough-graded and ripped to prevent water pooling, ponding, and erosion, and to create water catchment basins to facilitate the revegetation of the disturbed areas (see Section 6.6h). Stockpiled soil material will be distributed on the tops and the accessible level portions of the waste rock stockpile and haul roads prior to fine grading and broadcasting seeds with the proposed seed mixtures.

The leach pad will be constructed with maximum slopes not to exceed 2H:1V for final reclamation. The sharp contours of the top and bottom of the leach pad will be rounded and softened, and the graded material extended outward far enough to overlap the perimeter berm that encircles the leach pad. Grading of the pad would leave in place the interceptor ditch around the pad, thereby diverting all runoff away from the pad area. Upon final mine closure, the top and slopes of the leach pad will be rough-graded and ripped to prevent water pooling, ponding, and erosion, and to create catchment basins to facilitate the revegetation of the disturbed areas (see Section 6.6). A typical cross-section of a reworked leach pad is shown in Figure 10.

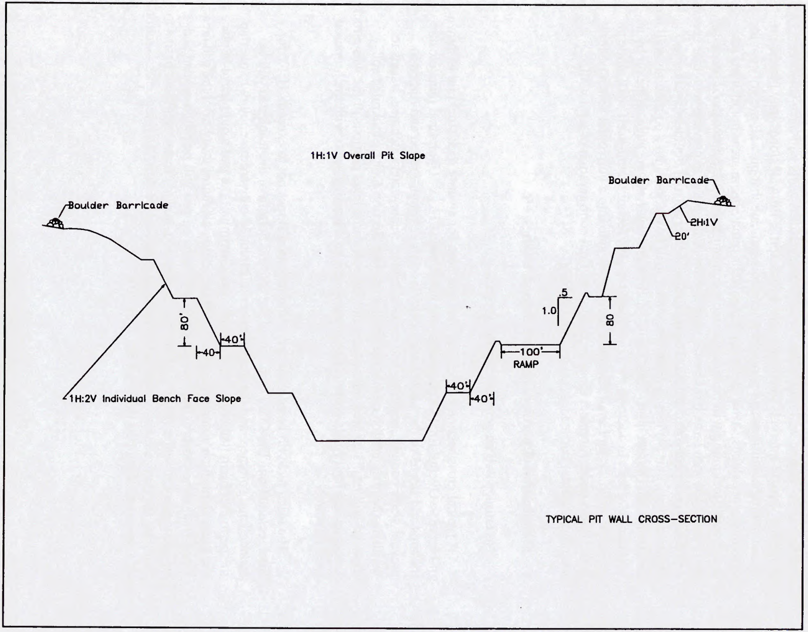


Figure 8: Cross Section of a Typical Pit

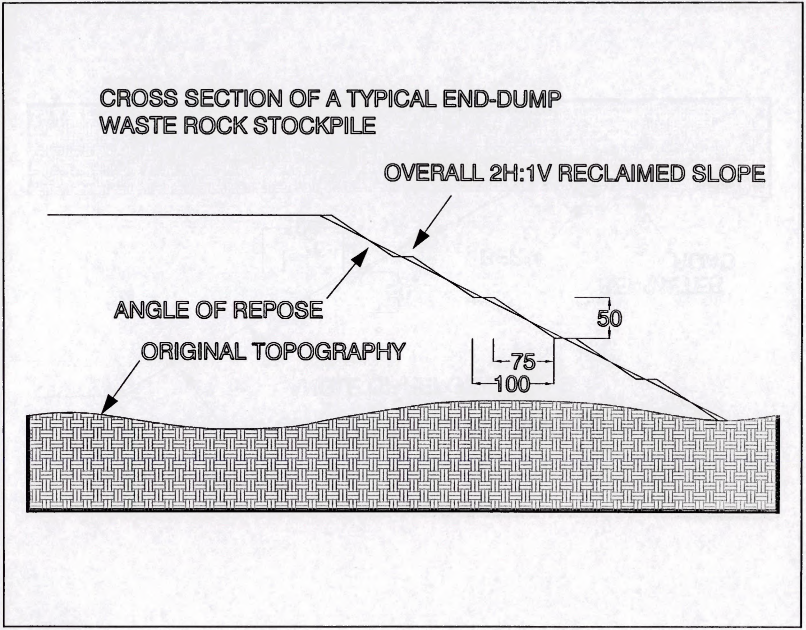


Figure 9: Cross Section of Typical End-Dump Waste Rock Stockpile

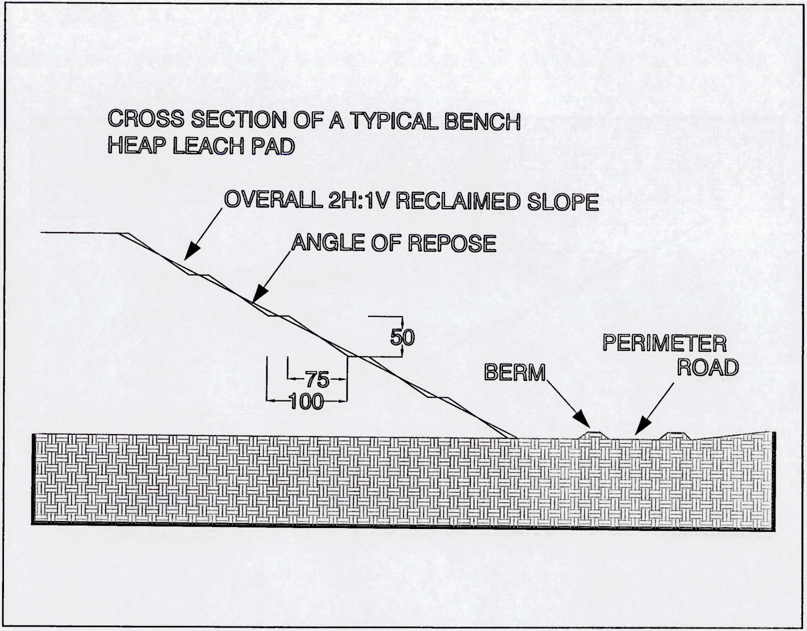


Figure 10: Cross Section of Typical Bench Heap Leach Pile

d) Rehabilitation of pre-mining drainage

Included as Attachment D is a report titled "Hydrologic/Hydraulic Analysis for West Pit and East Pit Diversion Ditches", authored by Hanson Engineering in May of 1997. This report provides the results of hydrologic analyses of the major runoff basins tributary to the Project and the design of diversion structures, labeled West Pit West Diversion, West Pit East Diversion, Singer Pit East Diversion, East Pit West Diversion, and East Pit East Diversion for those drainages. All surface drainages in the area are ephemeral, with flows occurring only during and following major precipitation events (see Figure 11). Those sections of the existing washes which could convey storm waters around or through the Project mine and process area without impacting Project facilities will not be altered by the Project and will continue to carry storm flows through and around the Project mine and process area. However, several of these ephemeral drainages must be permanently diverted around the facilities located within the Project mine and process area. Each of the diversions has been designed to direct water back into the same major drainage system from which it was diverted (see Figure 12). At no time would flows be diverted into other major drainage systems. Diversion channel construction would be phased with the pit mining sequence. All diversion channels have been designed to safely convey all runoff flows from the 100-year, 24 and 6 hour precipitation events, and will be built to approximate the original drainage system gradient and channel geometry (see details in Attachment D, Section 6.6h) [**Diversion Channels**], and Figure 12). During the period that the pits are open, although not anticipated, the diversion channels may be temporarily lined with high density plastic or cement grout, and protected by rip rap to prevent subsurface flows into the open pit. Areas of the diversion channels not lined will be reclaimed with initial diversion channel construction. All diversion channels will re-connect with the same wash system at a point just downstream of the open pit. Additionally, any areas which might be especially susceptible to erosion from surface flows are to be bermed and/or rip-rapped to prevent erosion and potential damage during the period when the pits are open. All bermed and/or rip-rapped areas will be maintained while the open pits are being mined to prevent wash erosion.

Once the pits are mined out or backfilled, any rip rap or areas with temporary plastic liners installed in the diversion channels would be removed and the channel regraded. Once the liners or rip rap have been removed, the channel slopes and banks would be reclaimed with species listed in Section 6.2 including young ironwood and palo verde trees or seedlings to begin reestablishment of microphyll woodland habitat.

The largest diversion routes the westernmost Project mine and process area wash around the West Pit. As shown on Figure 12, the drainage would be diverted at a point just north of the West Pit 's northern waste rock stockpile, and would channel any potential surface flows into a diversion structure located west of the West Pit.

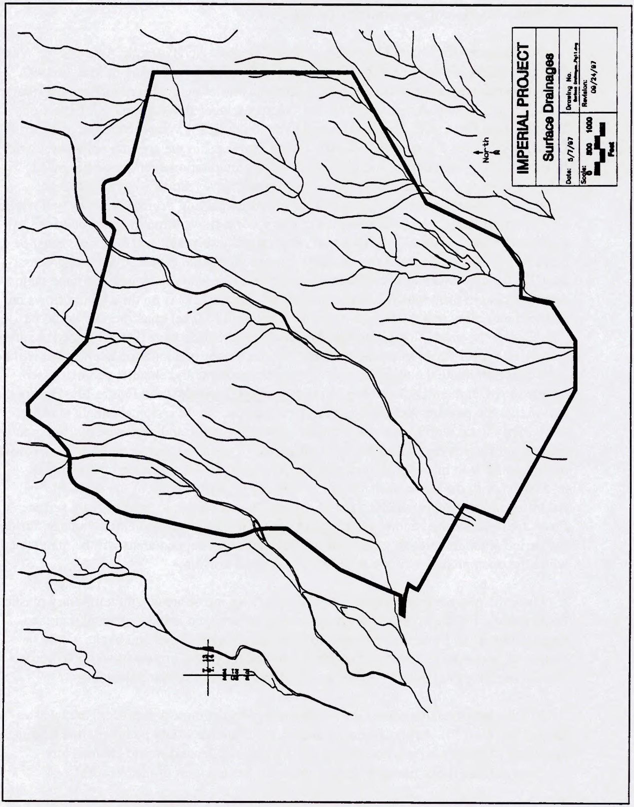


Figure 11: Surface Drainages

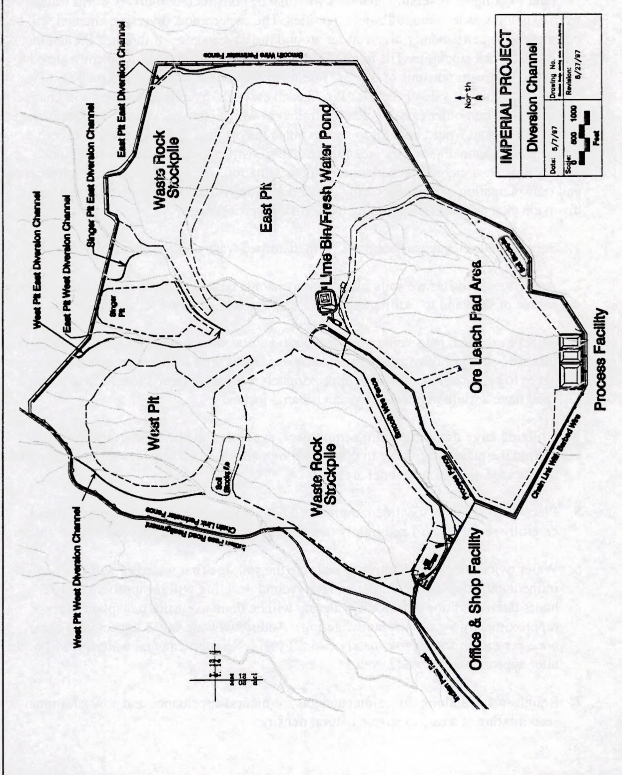


Figure 12: Diversion Channel Locations

Four (4) smaller diversion channels will also be constructed to divert storm waters from existing washes around Project facilities. The easternmost diversion channel will be constructed to permanently divert water around the eastern edge of the East Pit and the north waste rock stockpile. The three (3) other diversion channels, will be constructed to divert the upstream portions of three (3) stems of the central wash around the West Pit, Singer Pit, and west side of the East Pit. In each case, all diversion channels will channel surface flows into other existing nearby drainages which flow back into the same major wash system, and would be built to approximate the original drainage system in both gradient and channel geometry (see Figure 13). Construction of all diversion channels will include wash habitat reclamation. This reclamation will include immediate relocation and transplantation of existing wash soils and microphyll habitat shrubs and trees to the diversion channel benches, utilizing the following procedures:

1. Salvage and relocate surface soils from disturbed wash areas to diversion channels.

2. Apply salvaged surface soils to diversion channel benches, banks and in channels as a source of seed and to facilitate restoration of the soil substrate for revegetation.

3. Select ironwood, palo verde trees and wash habitat shrubs and cactus for transplanting that are young, healthy and are able to be excavated with sufficient root/stem biomass. Trees to be transplanted will be approximately no greater than 8 feet in height and/or shall have a trunk diameter no greater than 3 inches.

4. Utilizing large mine excavating equipment, excavate the plant and as much soil around the plant as possible to preserve root material and transport selected transplant to prepared diversion channel area.

5. Place the transplant specimen in prepared hole, arrange roots for maximum spread, carefully shovel in soil and lightly tamp area around plant to collapse large air spaces.

6. Water twice after transplanting to saturate the soil; the first watering will be immediately after transplanting and the second watering will be approximately 3 hours later. Additional periodic watering will be done to ensure transplant success (approximately 5 gallons/plant/watering). Additional watering is expected to occur once per month for approximately two (2) years. No supplemental watering will occur after approximately two (2) years.

7. Rough surfaces along diversion channels for natural appearance and sow additional seed mixture at a rate to ensure natural density.

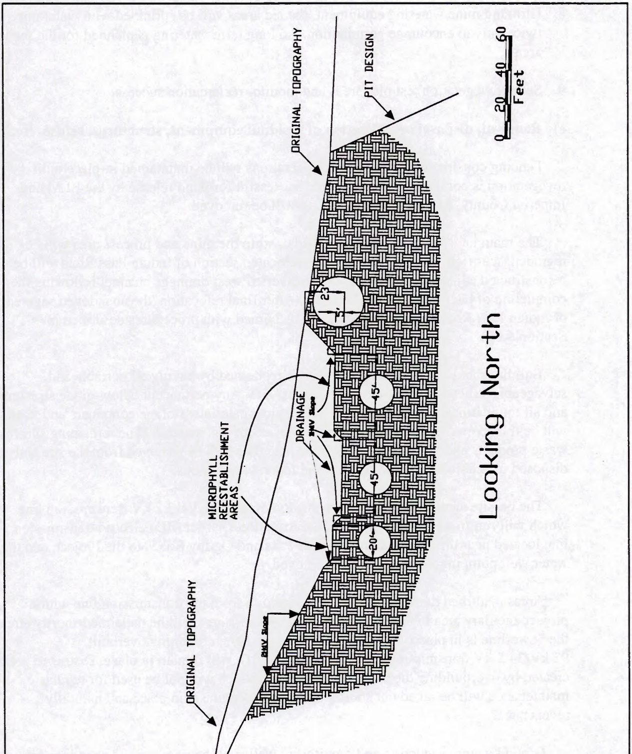


Figure 13: Diversion Channel Design

8. Utilizing mine watering equipment, seeded areas will be sprinkled with water once or twice only to encourage germination. No long term watering is planned for the seeded areas.

9. Setup revegetation test plot areas and monitor reclamation success.

e) Removal, disposal or utilization of residual equipment, structures, refuse, etc.

Fencing constructed for the Project operations will be maintained in-place until revegetation is complete and determined successful for bond release by the BLM and Imperial County. At that time, all fencing will be removed.

The main haul roads and all other roads within the mine and process area will be regraded, scarified, and revegetated. The relocated section of Indian Pass Road will be reconstructed adjacent and parallel to the diverted west drainage channel following the completion of backfilling of the West Pit. After final relocation, the abandoned segment of Indian Pass Road will be regraded and reclaimed with procedures described in Section 6.6h).

Buildings and ancillary facilities will be reclaimed by having all portable and salvageable structures removed and taken off-site. Any permanent below-grade structures and all foundations will be removed. All surplus materials, storage containers and trash will be transported to a landfill authorized to accept this material. The remaining surplus waste products and all fuel oil and similar materials will be removed from the site and disposed of according to current state and federal regulations.

The on-site electric substation, the portion of the 92 kV/13.2 kV transmission line which will run from the existing Imperial Irrigation District (IID) electric transmission line located near the intersection of Indian Pass and Ogilby Roads to the Project, and the water well pumping facilities will be removed.

Areas disturbed during powerline construction from the transmission line within project ancillary area to the Project mine and process area will be reclaimed shortly after the powerline is in place, and again after removal. The remaining overbuilt 92 kV/34.5 kV transmission line, owned by the IID, will remain in place. Disturbed areas created by overbuilding the 92 k V/345 k V line which will not be used for regular maintenance will be raked out shortly after the powerline is in place and naturally revegetated.

Ground water production and monitoring wells will be plugged and abandoned in conformance with applicable regulatory requirements (14 CCR 3713(a)). The buried ground water pipeline will be abandoned in-place. The buried water pipeline construction

corridor will be reclaimed after pipeline installation is completed with procedures described in Section 6.6h).

f) Control of contaminants, especially with regard to surface runoff and groundwater

The leach pad and process ponds will be designed as lined, zero-discharge facilities with leak detection systems, in conformance with CRWQCB-CRBR requirements (as per #97-040 ROWD). The process ponds and storm water overflow pond have been designed, and will be built, with sufficient capacity to contain the normal operating volume of solution and the rainfall run-off from the exposed area of the heap following a maximum probable one (1)-hour storm event occurring simultaneously with a 24-hour power outage, while maintaining a two (2)-foot freeboard. Process chemicals, as described in Section 5.2., will be stored in secured areas in weather-proof containers, in accordance with local, state and federal regulations and company safety policies.

At the completion of leaching, the spent ore on the leach pad will be rinsed with fresh water to neutralize and reduce cyanide levels to below those specified by the CRWQCB-CRBR. After rinsing is complete, in order to meet the requirements of the CRWQCB-CRBR-issued Waste Discharge Order, sampling and laboratory testing will be conducted to evaluate and verify completion of the neutralization process.

Based on laboratory analyses, field experience at Glamis Imperial's sister operation, the Picacho Mine, and results from other existing mining operations, the spent ore material on the heap can be neutralized by washing in-place with fresh water to meet the requirements of the CRWQCB-CRBR.

Once neutralization of the leach pad has been completed, which may require twelve (12) months of rinsing, all neutralized process waters and rinse solutions will be evaporated in the ponds or by sprinklers on the heap. A neutralizing agent may be added to the process waters and rinse solutions to reduce the cyanide level to meet CRWQCB-CRBR standards. Process water ponds would then be reclaimed by filling with material from the berms or neutralized material from the heap, regrading and revegetation, but the final neutralization and reclamation of the ponds would not occur until the neutralization of the pad had been completed to the satisfaction of the CRWQCB-CRBR.

Piezometer holes drilled in the projected locations of the bottoms of the East Pit and the West Pit have encountered ground water at depths of 88 feet AMSL and 211 feet AMSL, respectively, which is above the anticipated floor of the respective pits. While hydrologic tests, conducted on the piezometer holes, have indicated that the hydraulic conductivity of the bedrock formation is very low, it is possible that ground water will enter each of the pits during mining operations. Should ground water be encountered in

the pits during mining operations, it would be utilized in dust control operations, or collected and used in process operations.

Analysis of normal evaporation rates at the Project indicates that evaporation will be in the range of 100 times the anticipated quantity of ground water inflow. Because the evaporation rate so greatly exceeds the ground water inflow rate, there is little possibility that ground water will accumulate in the bottom of the open pits.

While water is not anticipated to accumulate in the bottom of the pits, Glamis Imperial will analyze the potential for a pit lake to form at the end of mining. Should this analysis indicate that a pit lake may form, Glamis Imperial will place sufficient backfill into the pit, raising the floor of the pit to a level higher than any pit lake which form.

Any soil material contaminated by spills of regulated waste materials, such as fuel oil, waste lubricants or gasoline, will be collected, contained, and either remediated onsite (if permissible under then-current regulations) or removed from the site and disposed of in conformance with then-current regulations.

To insure containment of sediment erosion during mining, several sediment traps have been designed around the Project facilities to contain the 100-year, 24-hour storm event. Surface runoff and sediment from Project facilities will be contained on site within these sediment traps. These traps will insure Project surface runoff will remain separated from the off- project runoff occurring in the through going washes and diversion channels as described in Section 6.6g).

g) Treatment of streambeds and streambanks to control erosion and sedimentation

Erosion Control

No perennial streams exist in the area. As discussed in Section 6.6a), ephemeral drainages exist which can carry water during and after storm events. Some of the washes will require permanent diversion around Project facilities within the mine and process area.

To minimize erosion and the production of sediment, all channels, and adjacent streambank vegetation which is not to be directly impacted by the construction of Project facilities, will be left intact and protected from incidental disturbance from mine activities within the Project mine and process area.

To minimize impacts from erosion on the Project area and down surface-gradient areas, all mine facilities, such as the heap leach facility, waste rock stockpiles, topsoil stockpiles, and roads, will be designed and constructed with appropriate erosion control features. Erosion control features as described in Section 6.6f) will be designed to meet

the performance standards of 14 CCR 3706. Additionally, in accordance with the Storm Water NPDES General Permit requirements, Glamis Imperial will prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which is a site-specific plan to control drainage and erosion.

Diversion channels will be designed to follow the cross section and slope of the existing channel as much as possible, and the channel banks will be reclaimed upon construction and as described in Section 6.6h). If necessary, diversion channels will be lined with rip rap to minimize erosion during flow events.

Sediment Control

Techniques used to control the production of sediment are included in the overall grading design and the revegetation plan (see Section 6.6h)). Any storm water surface flows entering the Project mine and process area will be routed away from Project facilities with diversion channels. Methods to be employed, if necessary, to reduce or prevent the generation of sediment from within the Project mine and process area would include berms, sediment ponds, rip rap, check dams, sand bags, silt fences, or other temporary techniques to minimize impacts.

All surface runoff generated from disturbed areas within the Project mine and process area would be collected in the active pit(s), collected in the heap leach system and added to the process solution volume, or collected and directed to sedimentation basins for infiltration. No runoff from disturbed areas within the Project mine and process area would be directed into the existing drainage system.

Erosion control methods will be designed to handle a twenty 24-hour, 100-year storm event, in accordance with standards established by 14 CCR 3706(d) (SMARA regulations).

The heap leach pad has been designed to contain the probable maximum precipitation (PMP) event in accordance with CRWQB-CRW, Waste Discharge Order requirements.

h) Resoiling, revegetation with evidence that selected plants can survive the site's topography, soil and climate

The experience at Glamis Imperial's sister operation, the Picacho Mine, where significant reclamation and revegetation progress has been achieved, has provided valuable information which has helped guide reclamation and revegetation planning efforts at the Imperial Project. The revegetation procedures at the Picacho Mine addressed several factors which will also affect revegetation of the Imperial Project, including:

- Growth of desert plants is slow even under the most favorable conditions, and revegetation is also slow.

- Weather is the single most influential factor affecting revegetation, and its extreme variability makes revegetation planning difficult and brings mixed results.

- High winds, heat and aridity are common meteorological site factors which adversely impact revegetation efforts.

- Long term watering and fertilization artificially stimulate plant growth, cannot be sustained after mine closure and increase plant palatability to herbivores.

- Transplanting of shrubs, young trees and cacti can be successful with proper selection of plants and care in transplanting.

The above-listed factors suggest that the most successful revegetation plan is one which relies primarily on natural processes and requires little intervention once site preparation is complete.

Revegetation over the majority of the Project will include: salvaging and stockpiling available soil; contouring and shaping accessible disturbed areas; reapplying soil material as necessary; preparing seedbeds; optimizing seed mixtures and rates; seeding and transplanting; monitoring; and reporting. Revegetation activities in the diversion channels and washes will include redistribution of soil, direct transplantation of trees and shrubs, seeding, monitoring and reporting.

Revegetation treatments may be the same as have been used elsewhere, such as at American Girl or Picacho Mines, but will be based on Project site test plots developed for the site-specific conditions of the Project area. Test plots for the Project will be located in upland and wash habitats (see Figure 14).

Revegetation testing will be conducted during the life of the Project as areas become available. A seed collection program was initiated in 1996 and will continue to be conducted periodically throughout the life of the Project. This will provide seeds of native, acclimatized vegetation for the revegetation effort.

To aid in revegetation of the Project mine and process area, the naturally vegetated areas between the disturbed areas, such as between roads and pits and the undisturbed portion of the central wash, will be managed as undisturbed buffers to serve as natural seed sources, providing protection for small mammals, birds, and reptiles.

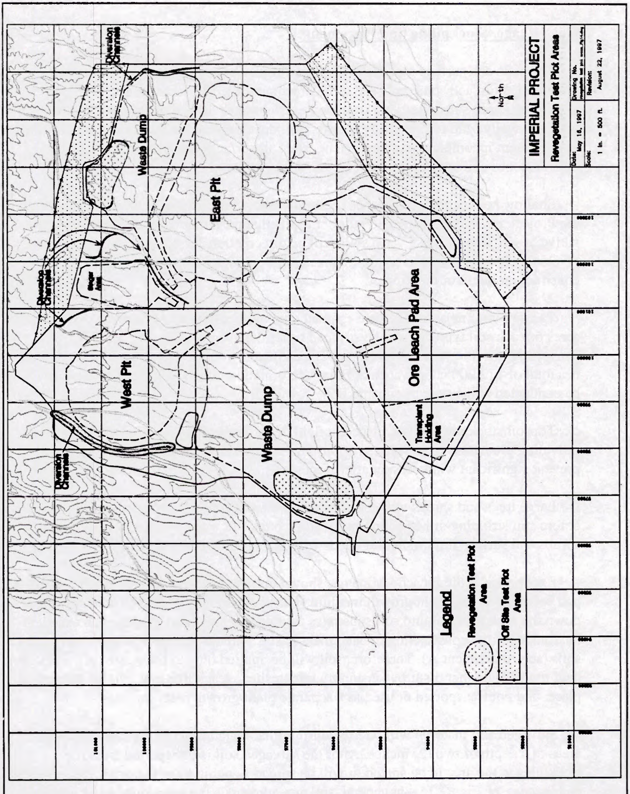


Figure 14: Revegetation Test Plots

Soil Salvage, Stockpiling and Placement

The soils and surface material within the Project area were evaluated as a plant growth medium and source of seed (see Attachment E). The soils formed from the alluvial (upland) substrates vary from non-existent to shallow draughty and skeletal soil with a gravelly sand to fine sandy texture. Soil development has been slow and profile development incomplete or non-existent. The soil surfaces are fairly stable, and the upland slopes and desert pavement are old and weathered.

Shallow soils within the washes (generally 0 to 18 inches thick) which occur within the Project area have texture and nutrient levels that are suitable for use in revegetation to native desert plants. These wash soils will be directly transferred and reapplied to diversion channels (see Diversion Channels) and salvaged and stockpiled during the construction phase of the Project.

The soil volume amounts were estimated by multiplying the percentage of area in acres of each soil type that can be stripped times the average stripping depth, and converting to cubic yards as a volume. The estimated volume of soil suitable for stripping is a total of 112,200 cubic yards. A field determination of soil salvage and suitability will be conducted at the time of construction.

Topsoil stockpiles will be placed in field determined locations away from washes, providing protection from water erosion. The sandy and stony nature of the soils will prevent significant wind erosion after placement.

Large trees and shrubs will either be removed and appropriate specimens transplanted before soil stripping or buried in topsoil stock piles and waste rock stockpiles. Small shrubs and surface litter including seeds will be incorporated into the topsoil stockpiles.

Experience at the Picacho Mine has shown that the leached material on the heap leach pad becomes an excellent growth medium. The application of solution ultimately breaks down the rock material into soil substrates containing fines. This produces an excellent landscape for the construction of catchment basins without the application of stockpiled soils (see Attachment A). Therefore, soil will be applied only to the waste rock stockpiles, haul roads, and other disturbance areas while the heap leach material will be reclaimed in place, and not transported or used as a separate plant growth medium.

Salvaged soil material will be used during final reclamation by spreading in selected areas to a depth of two (2) inches. After the salvaged soil is transported from the stockpiles to the area to be spread, it will be spread as a thin layer using a scraper or front end loader (see Figure 15). In general, soil amendments have not proved to be necessary or effective in this desert climate in promoting or enhancing plant growth. The results of

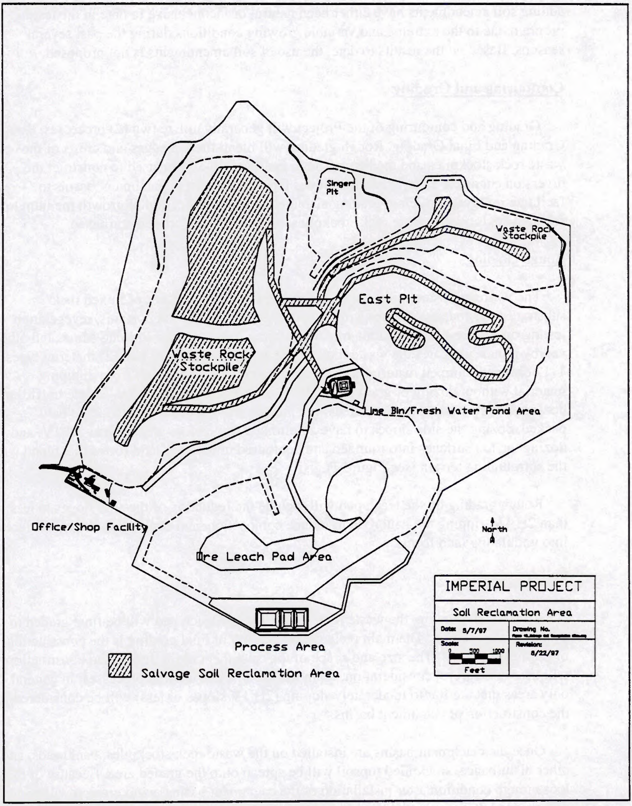


Figure 15: Distribution of Stockpiled Soil Material

adding soil amendments have either been neutral or inconclusive to date in the testing program due to the extreme and variable growing conditions during the past several seasons. Based on the results to date, the use of soil amendments is not proposed.

Contouring and Grading

Grading and contouring of the Project will generally utilize two (2) processes, Rough Grading and Final Grading. Rough grading will blend the top edges and crests of the waste rock stockpiles and the heap. Rough grading will also be used to construct the diversion channels. Final grading includes the construction of catchment basins to facilitate revegetation. Final grading also includes the application of growth medium to selected areas on the waste rock stockpiles, haul roads, and other disturbance.

Rough Grading

The waste rock stockpiles, when complete, will have surfaces of mixed rock substrates and coarse alluvium with little developed soil. To support this, revegetation testing on similar sites at Glamis Imperial's sister operation, the Picacho Mine, and other nearby mines, indicates the waste rock stockpiles are made up of two (2) material types. 1) Loose, end-dumped material with undulating surfaces that result from dumping material without dozing or grading. 2) Hard-packed surfaces left from vehicle traffic and dozing. Rough grading in these areas will include ripping those areas that are hard packed, dozing the side slopes to have an ultimate slope of no greater than 2H:1V, and dozing the top surfaces into rounded and contoured undulating land forms that blend with the surrounding terrain (see Figure 7).

Rough grading on the leach pad will include the reduction of the side slopes to less than 2H:1V, ripping the haul road to reduce compaction, and contouring the top surfaces into undulating land forms.

Final Grading

After rough grading, the waste rock stockpiles and leach pad will be final graded to promote revegetation. The main reclamation activity in final grading is the construction of catchment basins. The size and shape of the catchment basin design and construction will take into careful consideration, drainage patterns and erosion processes. In general, only areas that are flat to moderately sloping (2H:1V slopes or less) will be considered for the construction of catchment basins.

Once the catchment basins are installed on the waste rock stockpiles, haul roads, and other disturbance, stockpiled topsoil will be spread onto the graded area. Because of the loose rough condition after installation of the catchment basins, wind erosion will be decreased. Additionally, the catchment basins will provide areas of enhanced moisture

retention, encouraging establishment of seedlings in small crevices. Experience at other revegetation testing areas has shown that this will ultimately produce a landscape having pockets in which plants will naturally become interspersed.

Diversion Channels

Diversion channels will each be designed and constructed to safely convey the calculated runoff from the 100-year, 6- and 24-hour precipitation event through the Project mine and process area and deliver this water back into the major wash system from which it was diverted. They will also be designed to reflect the basic characteristics (width, depth, slope) of the washes in the area and the earth materials in which they are constructed (see Figure 13). The construction of the diversion channels will be phased to coincide with the mining sequence.

One of the reclamation plan primary objectives is the reestablishment of microphyll woodland habitat along the channels which divert the throughgoing washes. This reclaimed acreage will roughly be equivalent to that currently found in the diverted wash systems. Wash habitat reclamation will occur concurrently with diversion channel construction, principally by direct transplanting existing wash trees and shrubs along the slopes and banks of the permanent wash diversion channels. Additional reclamation will include planting young ironwood and palo verde trees or seedlings, and seeding the banks and slopes of the channels with a mix of seeds representative of the existing microphyll woodland vegetation. In addition, it is expected that the bottoms of these stream channels will quickly reflect the existing washes in the area as a result of the natural movement of sediment and seed source through the channel during flow events.

Revegetation Test Plots

In order to provide the basis for specific reclamation methods and techniques which will be used at the project, revegetation test plots will be setup early in the mine life. The objective of the test plot program is to provide long-term and robust plots which will be evaluated throughout the mine life and to utilize test plot results to modify and continue developing reclamation methods.

The revegetation testing program for the Project upland and wash habitats will include:

- Setup the wash habitat revegetation test plots in diversion channels using transplanted trees and shrubs specimens from the mine site and locally collected seeds from the seed bank.
- Setup revegetation test plots on the wash and uplands habitat locations proposed; seed plots during late spring/early summer and late fall, with native plant species including

shrubs and trees using the seeds collected in the seed collection program. Transplant ocotillo and cactus.

- Establish areas for plots by grading and surface reconfiguration during the 4th to 5th year of mine development and operations, or when surfaces are available (see Figure 14). Fine grading into catchment basin of between 4,000 and 5,000 square feet. This size will be sufficient to capture rainfall and direct the water to test plots of about 150 square feet in the lowest portion of these basins. The test plots will be used to receive transplanted plant specimens and to test methods for sowing and germinating seeds collected during the program.

- Perform annual monitoring and utilize test plot results to confirm or modify reclamation methods.

Range of treatments to be tested include:

- Land shaping and grading the surface topography into various forms and sizes of moisture catchment basins;
  - slopes will be prepared according to specification in Reclamation plan.
  - basins will vary in size and form depending on type and size of substrate material and degree of slope.
  - basins will be configured to prevent surface runoff and erosion, that is, for complete capture of rain and storage as moisture in the soil without sediment transport.
  - drainage in washes will be established across the site as depicted on the final topography drawing, with a west, central and eastern main wash pattern.

- Transplanting concurrently salvaged plant specimens into the prepared catchment basins, and to enhance wash habitat revegetation;
  - transplant species will include cactus, ocotillo.
  - set up treatments for survival testing the time of year for transplanting and initial water application.

- Sowing the basins with seed from;
  - surface collections from under shrubs and wind-rowed litter, and the seed bank generated from specific collections during years of good seed set.
  - salvaged surface soil and seed contained in these soils.

Additional/similar revegetation test plots have been constructed at Glamis Imperial's sister operation, the Picacho Mine. Due to the Picacho Mine's proximity to the Project and similarities in vegetation, the knowledge gained from these Picacho Mine test plots have provided guidance to future revegetation and reclamation activities at the Project.

While treatments utilized on the Imperial Project may be the same as have been used at Picacho and American Girl Mines, they will ultimately be designed for the environmental conditions specific to the Project. Results from the test plot monitoring conducted at the Picacho Mine are summarized in the reclamation reports submitted to Imperial County and are attached to this reclamation plan as Attachment A and Attachment B.

Ongoing monitoring of Picacho Mine reclamation, and Imperial Project concurrent and interim reclamation, will provide information for refining the Project seeding and revegetation plan. This data may be used to update the seeding revegetation plan, subject to the concurrence of the BLM and Imperial County, prior to the start of final reclamation and decommissioning of the Project mine and process area.

Soil Reapplication

A minimal amount of useful soil (growth media) exists within those portions of the Project mine and process area to be disturbed. After completion of diversion channel reclamation, the remaining salvaged and stockpiled surface will be distributed as equitably as possible to all the areas to be revegetated.

Revegetation experience at the Picacho Mine indicates that the neutralized leached ore on the heap is excellent in-place growth media. Based on this experience, little or no soil is needed on the leach pad to achieve revegetation success. With that in mind, the remaining stockpiled soil will be used to reclaim as needed, waste rock stockpiles, haul roads and ancillary facilities areas (see Figure 15).

Where necessary, areas of compacted material will be ripped prior to application of the salvaged soil. Topsoil will be placed on prepared areas in the early fall or immediately after final grading, just prior to seeding. Topsoil placement will be monitored to ensure that a sufficient depth of material is being placed. The surface will be left in a rough or furrowed state to reduce wind and water erosion and to increase available moisture in the surface soil layer.

Collecting Seed Sources

In general, locally-adapted seeds are available from two (2) sources: (1) seeds in surface soils salvaged during construction from the shallow washes on the site; and (2) seeds hand-collected from plants and soils on and in the vicinity of the Project. Glamis Imperial has instituted a seed collection program that will be conducted throughout the life of the Project. The resultant seed bank will consist of a wide variety of seed from upland and wash species. This seed mix will be utilized on all areas requiring revegetation. It is expected that seeds from native species will germinate and grow in those situations where the plants are adapted. These seeds have a natural genetic

variability that promotes adaptation to a typical situation. This approach results in natural appearing vegetation which is self sustaining.

Seeds can be found in surface plant debris and organic matter under shrubs, and in wind-rowed furrows in undisturbed vegetation on slopes and in washes. Suitable locations in the Project area that have abundant seeds of several plant species that grow in relatively undisturbed vegetation will be determined by inspection. This source of locally-collected seed in surface soils typically will contain viable seeds from up to twenty (20) species of native perennial shrubs, perennial forbs, and annuals.

The species listed below will potentially be in the seed mix, either as banked seeds or as species which have typically germinated or can be expected from seed mixture. Some naturalized exotic species that are now part of the local flora will also be collected in the seed mix. Species are designated either as wash plants (w), upland (u) or common to both (b); deer browse perennial species are denoted as (db), and deer will graze herbaceous perennials and annuals in season:

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Trees		
Cercidium floridum	palo verde	w, db
Olneya tesota	desert ironwood	w, db
Shrubs		
Acacia greggii	catsclaw	w
Ambrosia dumosa	burrobush	b
Atriplex canescens	four-wing saltbush	b, db
Bebbia juncea	sweetbush	w
Calliandra eriophylla	fairy duster	w, db
Ditaxis lanceolata	lance-leaved ditaxis	w
Ditaxis neomexicana	ditaxis	w
Encelia farinosa	inciensio	b, db
Hibiscus denudatus	rose mallow	b
Horsfordia newberryi	yellow felt-plant	w
Hymenoclea salsola	cheesebush	w, db
Hyptis emoryi	desert lavender	w
Krameria erecta	purple heather	w
Krameria grayi	desert ratany	u
Larrea tridentata	creosote bush	b
Lycium andersonii	box thorn	w, db
Porophyllum gracile	odora	u
Psorothamnus schottii	indigo bush	u

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Simmondsia chinensis	jojoba	w, db
Stephanomeria pauciflora	wire lettuce	b
Grasses		
Achnatherum speciosum	desert needlegrass	u
Aristida purpurea	triple-awned grass	u
Bromus madritensis	red brome	b
Erioneuron pulchellum	fluff grass	b
Muhlenbergia porteri	muhly	w
Pleuraphis rigida	big galleta grass	w
Schismus barbatus	Mediterranean grass	b
Herbs		
Allionia incarnata	windmill	u
Amsinckia tessellata	fiddleneck	b
Atrichoseris platyphylla	gravel-ghost	w
Brassica tournefortii	mustard	b
Calycoseris wrightii	yellow tack-stem	b
Camissonia boothii	booth's evening primrose	b
Camissonia claviformis	club evening primrose	b
Camissonia refracta	narrow-leaved primrose	b
Chaenactis carphoclinia	pebble pincushion	u
Chaenactis stevioides	chaenactis	u
Chamaesyce albomarginata	white-fringed sandmat	b
Chamaesyce polycarpa	prostrate spurge	b
Chorizanthe brevicornu	brittle spine-flower	u
Chorizanthe corrugata	corrugata	u
Chorizanthe rigida	spiny chorizanthe	u
Cryptantha angustifolia	narrowleaved forget-me-not	b
Cryptantha barbigera	bearded forget-me-not	b
Cryptantha circumscissa	western forget-me-not	u
Cryptantha dumetorum	flexuous forget-me-not	u
Cryptantha holoptera	winged cryptantha	w
Cryptantha maritima	white-haired forget-me-not	w
Cryptantha micrantha	Nevada forget-me-not	b
Cryptantha nevadensis	Nevada forget-me-not	b
Dalea mollissima	idigo	u
Descuriana pinnata	yellow tansy mustard	b
Eremalche rotundifolia	desert five-spot	u
Eriastrum diffusum	eriastrum	b
Eriogonum inflatum	desert trumpet	u

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Eriogonum pusillum	yellow turbin	u
Eriogonum thomasii	thomas buckwheat	u
Erodium texanum	desert heron's bill	b
Eschscholtzia minutiflora	little gold poppy	b
Euphorbia eriantha	beetle spurge	b
Fagonia laevis	smooth-stemmed fagonia	u
Geraea canescens	desert sunflower	u
Gilia latifolia	sticky snakeweed	b
Guillenia lasiophylla	langloisia	b
Gutierrezia microcephala	peppergrass	u
Langloisia setosissima	calico	u
Lepidium lasiocarpum	lotus	b
Loeseliastrum schottii	small-flowered blazing	u
Lotus strigosus	ghost flower	b
Mentzelia albicaulis	small-flowered blazing	b
Mentzelia involucrata	sand blazing star	b
Mohavea confertifolia	ghost flower	u
Mirabilis bigelovii	four o'clock	b
Monoptilon bellioides	desert star	b
Nama demissum	purple mat	u
Nemacladus	thread plant	b
Nemacladus rubescens	rigid-stemmed thread	b
Oligomeris linifolia	linear-leaved cambess	w
Pectocarya platycarpa	broad-nutted comb-bur	u
Perityle emoryi	rock daisy	u
Phacelia crenulata	notch-leaved phacelia	u
Phacelia fremontii	fremont phacelia	b
Plantago ovata	plantain	b
Psathyrotes ramosissima	turtleback	b
Salvia columbariae	chia	u
Streptanthella	jewelflower	b
Trichoptilium incisum	yellow-head	b
Trixis californica	trixis	b
Uropappus lindleyi	silver puffs	w
Cactus (transplanted as stems or joints)		
Ferocactus cylindraceus	barrel cactus	u
Fouquieria splendens	Ocotillo	b
Opuntia acanthocarpa	buckhorn cholla	b
Opuntia echinocarpa	golden cholla	b
Opuntia basilaris	beavertail cactus	b

SCIENTIFIC NAME	COMMON NAME	DESIGNATION FOR PLANTING
Opuntia bigelovii	teddy-bear cholla	b
Opuntia ramosissima	pencil cactus	u

Based on previous tests in similar desert conditions and at the Picacho Mine, long-lived seeds of a variety of annual plants were noted to germinate after sowing under favorable rain and temperature conditions during subsequent growing seasons. There are very few weeds or undesirable seeds in the collections, provided the seeds are collected from soils in undisturbed native vegetation.

Seeds can be collected from plants and from underneath shrubs using hand implements such as shovels, trowels, or simply hand scooping the surface material (no more than the top one-half (½) inch) containing the seeds and placing this material in large paper bags. The collected material may at times contain a large percentage of plant litter and organic matter mixed with the seed. However, a large volume of this seed-containing material can be quickly collected, offsetting the low percentage of viable seed. A sufficient volume of seed-containing material can be collected in a short period of time to sow in those areas needing revegetation.

This method of seed collection by hand does not unduly disturb the native vegetation community since the seeds are not collected all in one place, nor from a single surface. This method of seed collection can be used to build up a sufficient reservoir of seeds during those favorable years with good set and production. Based on seed bank storage experience at Picacho Mine, most of the seed will remain viable during the short period of time that the seed is stored, generally from a few days up to several years. Seeds of some desert plants are known to remain viable for long periods of time (decades) under favorable conditions. Seeds are dried, fumigated, and stored in plastic containers. Certain seeds, such as ironwood are frozen to prevent insect infestation. It is not necessary that all seeds of all plants species survive in order to establish good germination, vegetative growth, and productivity during reclamation.

Catchment Basin Design

Previous experience at Picacho, as described in Attachment A and Attachment B, has shown that, in this desert environment, catchment basins of 4,000 to 5,000 square feet (eight (8) to ten (10) catchment basins per acre) provide sufficient moisture collection to support seeding and transplant "garden spots" of 100 to 400 square feet. "Garden spots" are the lowest area in the basin where water saturates the soil, and are the areas where seeds will be sown and initial plant growth will be encouraged.

The shape of the catchment basins can vary from crescents on slopes to coupled, double-ended ovals on flatter tops of waste rock stockpiles and neutralized heaps. These catchment basins can be constructed either by dozing or by digging a depression with a front end loader and piling the excavated material as a low ridge to the upwind (northwest) side of the depression. The low ridge acts as a wind barrier to the prevailing, strong north and west winds in the Project area.

The seeding and/or transplant plot will be established in the lowest point of the catchment basin or in other depressions where water will collect. The seed mixture or transplant material is placed in the depression immediately after basin and plot construction when the soil surface is loose and the seeds will lodge.

In addition to the revegetation which will be conducted, it has been observed at the Picacho Mine that over time, some natural encroachment of native species (i.e., creosote bush, burrobush, inciensio, cactus, and buckwheat species) will occur. It is expected that these species will naturally occur in isolated groupings on the catchment basins and other disturbed areas.

Seedbed Preparation

Following catchment basin construction, stockpiled topsoil placement and final grading, seedbed preparation, seeding, and transplant efforts will be performed. The seedbed preparation activities will be performed as follows:

- Compacted surfaces will be loosened and left in a rough condition by ripping.
- The surfaces will be contoured into catchment basins which enhance moisture, promote seed germination and plant growth, and provide for stabilization of the surface material from wind and water erosion.

Seeding, Planting and Transplanting

Surface conditions for sowing seed are best immediately after surface preparation and/or soil placement since the surface is loose and friable, allowing the seed to be covered with no raking or harrowing. Seeds will be hand broadcast, or broadcast by rotary spreaders. Depending on the amount (volume) of seed collected, other portions of the basins will be lightly sown with seed or spread with growth media.

Plants deemed valuable for transplanting will be collected from the Project area prior to surface disturbance. Additionally, seedlings of some species may be grown from seeds collected from the area or equivalent sources. These plants will be carefully placed into prepared locations. Selected cacti species which occur within the disturbed areas of the Project will be transplanted to a holding area south of the of the leach pad. The holding

area will serve as a temporary holding for final reclamation placement (see Figure 14). The holding area will be sized to hold approximately 250 transplant specimens. The area will be prepared using salvaged soil and will be watered as necessary.

General procedures for transplanting are:

1. Transplant during the late fall and early winter for best survival.

2. Choose plant specimens for transplanting that are small, healthy, and able to be excavated with sufficient root compared to stem biomass. Ironwood and palo verde trees acceptable for transplantation will be approximately less than 8 feet in height, and/or with a trunk diameter of 3 inches or less.

3. Transplant small ocotilla, barrel cactus, cholla, and selected trees and shrubs.

4. Prepare holes in already established plots in catchment basins or depressions.

5. To preserve as mush soil material as possible, use a backhoe or other suitable equipment to excavate as much soil around the plant. Do not attempt to keep soil around the roots as a ball due to the loose, friable nature of the soil. The plants can be bare-rooted. The plant specimen to be transplanted should be trimmed of all dead material and trimmed back to the healthiest portion of the live stems. Most desert plants have a root that can be excavated, except for cactus. Most desert plants have root:stem ratio of 4:1 to 5:1, and this ratio should be preserved as much as possible by selectively pruning old growth and unhealthy stems.

6. Immediately transport to the plot for replanting preferably within six hours but transporting should be done the same day as excavation. Cactus and ocotilla can withstand some desiccation and may require hardening.

7. Place the plant specimen in the hole, arrange the roots for maximum spread, and carefully shovel in soil mix; do not leave large air spaces around the roots; tamp lightly with the feet around the completed transplant.

8. Water twice after transplanting to saturate soil; first watering should be immediately after transplant and a second watering about 3 hours later; additional watering should not be required unless there is more than 6 months between the original planting and the next rainfall event. Transplanted trees will require additional periodic watering once a month for approximately two (2) years.

9. Seedlings will be protected with a wire mesh cage if less than 12 inches tall. The wire mesh will be small enough to discourage predation by herbivores.

Appropriate plants, including ocotillo and young ironwood and palo verde trees or seedlings may be collected from Project areas prior to disturbance and transplanted, to locations in areas within the Project which are going to be reclaimed, or to off-site disturbed locations as directed by the BLM. All off-site transplanting is subject to agency concurrence.

Seed Mixtures and Rates

The intended seeding mixture will be collected from the natural sources located on surrounding areas and the Project area (see Collection Seed Sources). The revegetation seeding rates recommended will be based on test plots from the Project and Picacho Mine and in consultation with the BLM, Imperial County, and the California Department of Fish and Game.

For broadcast applications, equipment such as a "cyclone" spreader will be used to distribute collected seed immediately after grading, when surfaces are rough. The rate of sowing will be adjusted, by volume, depending on the visible seeds present. Generally, about one-half (½) cup of seed-containing material per catchment basin was sufficient in past trials using this method. Including areas between basins, this rate is estimated at about 8 to 10 pounds of native seed per acre.

Seed will be sown immediately following the fine grading of the water catchment basins while the soil surface is loose. Seeds will also be lightly sown between catchment basins. Subsequent rains and weathering processes cover the seed and prevent washing and blowing. The seed mixture will include native plant seeds collected in the local area designed to increase available browse for deer.

Schedule

Soil distribution and revegetation activities are limited by the time of year during which they can be effectively implemented. Table 5 outlines the anticipated revegetation schedule on a monthly basis which would be followed to achieve the reclamation goals and adequate revegetation. Site conditions and/or yearly climatic variations may require that this schedule be modified to achieve revegetation success.

By sowing seed and planting in the fall/winter and utilizing the available soil moisture accumulated during winter, growth would be encouraged for most seeds in the seed mix of endemic species.

Two kinds of germination are common: (1) fall or winter annuals and shrubs; and (2) spring or early summer germinators, generally shrubs and trees. Some native plant seed have been observed to germinate at any time of year after a significant rain. Reclamation has a better chance for success in years with average and above-average

precipitation, especially if adequate moisture is available during the November through April time period.

Table 5: Anticipated Reclamation Schedule

TECHNIQUES	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
Soil Distribution												
Regrading/Seedbed Preparation												
Seeding												
Transplanting from Storage												
Note: Regrading, transplanting or seeding activities could occur year round.												

Milestone Dates

The reclamation milestone dates shown in Table 6 provides the timing and establishment of reclamation test plots; backfilling of West and Singer Pits; neutralization, regrading and revegetation of the leach pad; scarifying, regrading and soil placement on haul roads and waste rock stockpiles; and removal and reclamation of ancillary facilities. The schedule also provides for the revegetation of disturbed areas.

The completion dates of the various elements shown on the reclamation schedule are based upon final completion of leaching, neutralization, and mining activities. Early or late completion dates in any of the activities for a leach pad will result in a corresponding change in the timing of the subsequent dates.

Test plots will be established early on the mine site, primarily on the waste rock stockpiles and diversion channels. These test plots will be monitored for the propagation and survival rate of revegetation. Since revegetation will depend upon precipitation, the amount of rainfall will have a direct effect on reestablishment of plants.

Table 6: Reclamation Milestone Dates

YEAR	RECLAMATION ACTIVITIES PLANNED
1	• West Pit diversion channels installed and reclaimed concurrently. Remaining West Pit area soils salvaged and stockpiled. • Sediment catchment basins will be installed around Project facilities. • Selected plant specimens will be transplanted to temporary holding area. • Powerline and water pipeline are reclaimed.
2	• Reclamation test plots installed in wash habitat. • West pit slope stability re-analyzed.
3	• Singer Pit, East Pit East diversion channels installed and concurrently reclaimed. • Singer Pit and East Pit area soil salvaged and stockpiled.
4	• Northeast waste rock stockpile completed with revegetation test plots. • Selected plant specimens will be transplanted to temporary holding area. • East pit slope stability re-analyzed.
5	• Backfilling West Pit is completed. • Start revegetation test plots and reclamation on south slopes of the south waste rock stockpile.
5	• Backfill Singer Pit. • East Pit West wash diversion channel installed and concurrently reclaimed. Central wash area soils salvaged and stockpiled.
6-10	• On-going reclamation testing and monitoring. • Return Indian Pass to location parallel to and east of the west diversion channel. • Reclaim the relocated portion of Indian Pass Road.
10-15	• Heap Leach Facility neutralized, initial leach pad reclamation. • Reduce slopes, install catchment basins and construct undulating land forms on the south waste rock stockpile.
15-20	• Final reclamation of Leach Pad. • All remaining facilities removed and reclaimed. • Reclamation success monitored and final bond release.

Weed Control

During the initial stages of the revegetation process, few invader (weed) species are known or expected in this portion of the hot deserts. As the revegetation process progresses, the natural succession of species would tend to foster those species best adapted to a particular site.

Weed species in revegetated areas would be managed to prevent spreading to nearby areas, and when they threaten the success of the proposed reclamation.

Tamarisk will be actively controlled throughout the mine life by an ongoing effort to eradicate any seedling or observed growth. The site is not considered a significant source of tamarisk seed as compared to drainages in and around the Colorado River. Based on the extent of the problem, selective spraying with a herbicide would be considered, subject to BLM approval.

Reclamation Success Monitoring

The goal of the revegetation program is to establish a vegetative density and diversity over the reclaimed area that promotes a productive ecosystem and establishes site conditions that promote the long-term development of a vegetation community typical of the local area. The final land forms of the mine site cannot be reclaimed to the original contours. Thus, the goals of the Reclamation Plan do not include restoration or revegetation to the original land form but to a natural state that blends with the existing undisturbed terrain.

There are several terms used to describe the amount and type of vegetation in a given area. These terms include vegetation diversity, vegetation density, and vegetation cover. The following definitions for these terms are used in this Plan:

Vegetative Diversity - The distribution and abundance of different plants species within a given reference area;

Vegetative Density - The number of individuals or stems of each species rooted within a given reference area; and

Vegetative Cover - The vertical projection of the crown or shoot area of a species to the ground surface expressed as a percent of the total reference area.

In order to monitor the revegetation efforts, comparisons will be made between revegetated sites and sites not disturbed by mining activities. To ensure that the analysis of the undisturbed vegetative community will be statistically valid to within an 80-percent confidence interval, vegetation parameters of the perennial herbaceous and shrub species plus cover of annual species will be sampled in washes, slopes and desert pavement areas adjacent to proposed disturbed sites.

The method proposed under this Plan (and used at the Picacho Mine during the revegetation testing program) is linear coupled transects. The linear plots (typically 2 x 10 meters in size, or larger) are laid end-to-end and oriented parallel to, or across, environmental gradients. A 30-meter steel tape is stretched between markers. Lines of transects generally run for 500 meters or more, depending on the ecological scale of vegetation in relationship to topography.

The general areas to be surveyed under this Plan will be slopes and flats within the Project mine and process area and areas outside the Project mine and process area that will not be disturbed by mining. Vegetative, topographic, erosional, and soil parameters will be noted in each plot. The transects will be analyzed for the cover, dominant species, type of vegetation, and amounts of bare areas as they relate to topography and substrate.

The linear transects will include wash and upland areas from randomly selected points near the Project mine and process area.

Figure 16 shows the location of both onsite and off site Vegetation Baseline Survey transect areas to be used in the Plan. Similar linear transects will be measured on the reclaimed site using an analogous systematic random location method. An attempt will be made to have approximately the same number of samples on the reclaimed sites as on the adjacent areas.

The transect parameters for estimating or measuring vegetation are: (1) the percent cover by species; and (2) the number of shrubs and perennials by species. Topographic and substrate features will be observed. The number of samples will depend on the heterogeneity of the linear plots being surveyed. Sample adequacy for the number of factors being measured are generally not of concern, but a large number of samples is required for analysis.

The results of the transects will be analyzed for the vegetative types, percentage cover, density, diversity, and sizes of area with low vegetative cover. The parameters will be developed using statistical means and standard deviations. The correlation coefficients between these variables can be determined for application toward developing the range to be used in the standards, if needed.

Separate standards for wash and upland vegetation types will be established. Trees removed due to the construction of the diversion channels will be replaced by transplantation or seedlings at the natural density as indicated by baseline studies of the washes. Standards for wash revegetation will be based on results collected from off site transects in the washes surrounding the project. Standards for upland revegetation will be based on results from off site transects on slopes and desert pavement.

Glamis Imperial proposes that the standard for the reclaimed surfaces be set at a percentage of density and diversity of selected, similar, adjacent vegetation measured in comparable areas. Reclamation efforts will be considered successful when the results of revegetation monitoring show that there has been an establishment of 30 percent or more of the vegetation density and 33 percent or more of vegetation diversity of the perennial species in the monitored reclaimed and revegetated areas, as compared to the offsite similar vegetation for two (2) consecutive years.

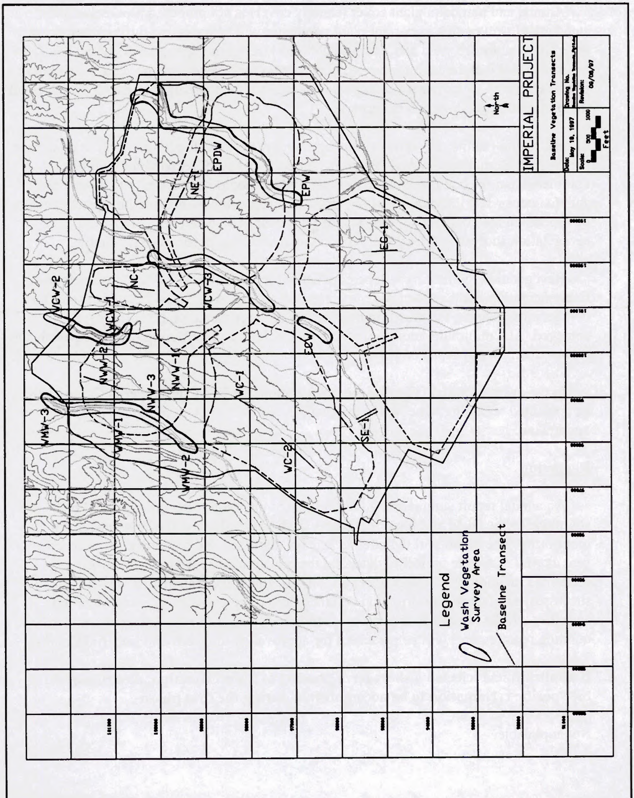


Figure 16: Baseline Vegetation Transects

Annual and perennial plant cover (canopy cover) is not proposed as a reclamation standard. However, this important plant parameter will be measured during monitoring to determine the forage yield and relative ecological health of the reclaimed areas. It is also recommended that the monitoring and bond period for revegetation be set at a maximum of five (5) years, or earlier if adequate rains occur and plant germination and growth equal the proposed vegetation success criteria.

Following facility decommissioning, grading to desired slopes, distribution of surface soil/growth media, and seeding, the principal components of reclamation will be completed and the bonds related to those activities should be released. Final bond release should occur when the stability of the graded Project components and the reestablishment of vegetation are confirmed. Performance with quantitative determinations of revegetation success will trigger final bond release of that portion of the bonding.

Revegetation monitoring will be conducted for a minimum of five (5) years following implementation of the post-closure revegetation activities, but would continue until the revegetation success, as defined in this section of the reclamation plan, has been achieved. At a minimum, monitoring activities will take place during the peak growth and flower time, usually April or May.

In the event of initial failure of the revegetation, the BLM and Imperial County will be consulted regarding remediation alternatives and revegetation measures to be undertaken.

Reporting

An annual report summarizing the findings of the monitoring program will be submitted to the BLM and Imperial County each year following the commencement of monitoring. The report will include the acreage disturbed and reclaimed for the current year as well as for the project to date, and the remaining acreage to be disturbed and reclaimed. In addition, the annual report will document the reclamation activities, successes, and failures. Information obtained during the previous year's reclamation activities will be reviewed, and any proposed modifications to the Reclamation Plan or bonding requirements will be presented for approval by the BLM and Imperial County.

6.7 If applicant has selected a short term phasing of his reclamation, describe in detail the specific reclamation to be accomplished during the first phase

Not applicable.

6.8 Describe how reclamation of this site in this manner may affect future mining at this site and in the surrounding area

Implementation of the reclamation plan would not limit the future development of mineral resources in the area, although some mineralization may be concealed after placement of waste rock in some open pits. Currently uneconomic precious metal resources within the walls and floors of the remaining East will remain largely accessible for future development. In addition, overburden material in the waste rock stockpiles will be available for future development.

6.9 Statement that the person submitting the plan accepts responsibility for reclaiming the mined lands in accordance with the Reclamation Plan

See Attachment F.

7. FINANCIAL ASSURANCE

To establish an acceptable bonding instrument for the BLM, Imperial County and the California Department of Conservation, Glamis Imperial will allocate funds to post a bond for an amount consistent with the estimated cost of reclamation. An estimate of the cost of reclamation for the Project is provided in Table 7. A separate financial assurance to cover the estimated cost of neutralization of the leach pad will be posted with the CRWQCB-CRBR to meet that separate bonding requirement. Table 8 provides the calculation of the estimated cost of neutralization of the heap.

Since 1991, Picacho Mine has had an active and successful revegetation testing program. During this active testing phase, the costs of reclamation and revegetation have been calculated based on actual field results. Most of the costs estimated in Table 7 and Table 8 reflect experience at the Picacho Mine; additional costs for Table 7 were estimated from the Caterpillar Performance Handbook, the Contractor's Equipment Cost Guide (published by Data Quest), U.S. Bureau of Mines "Heaprec - A Methodology for Determining Cyanide Heap Leach Reclamation Performance Bonds (1992), and Means Heavy Construction Cost Data, 8th Annual Edition (1994).

Table 7: Costs for Physical Reclamation

COSTS FOR PHYSICAL RECLAMATION										
ACTIVITY	QUANTITY	UNIT	EQUIPMENT	QUANTITY	RATE	PER	UNIT	UNIT QUANTITY	UNIT COST ($)	TOTAL COST ($)
WEST PIT										
Backfill	N/A	N/A	N/A	N/A	Part of mining	N/A	N/A	0.0	$ 0.00	$ 0.00
SINGER PIT										
Backfill	N/A	N/A	N/A	N/A	Part of mining	N/A	N/A	0.0	$ 0.00	$ 0.00
Rip/catchment	32.6	ACRES	D10N	1.13	ACRES	PER	HOUR	28.8	$ 148.00	$ 4,269.73
Spread topsoil	8,768	CUBIC YARDS	631 SCRAPER	527	CUBIC YARDS	PER	HOUR	16.6	$ 198.00	$ 3,294.06
Seed	32.6	ACRES	N/A	2.25	QUARTS	PER	ACRE	73.4	$ 11.00	$ 806.85
Broadcast seed	32.6	ACRES	CYCLONE/HAND	N/A	LABOR	PER	ACRE	32.6	$ 16.00	$ 521.60
EAST PIT- Haul Road & Bottom										
Barricade Haul Roads	300	FEET	D10N	300	FEET	PER	HOUR	1.0	$ 148.00	$ 148.00
Rip/catchment	32.4	ACRES	D10N	1.13	ACRES	PER	HOUR	28.7	$ 148.00	$ 4,243.54
Spread topsoil	8,714	CUBIC YARDS	631 SCRAPER	527	CUBIC YARDS	PER	HOUR	16.5	$ 198.00	$ 3,273.85
Seed	32.4	ACRES	N/A	2.25	QUARTS	PER	ACRE	72.9	$ 11.00	$ 801.90
Broadcast seed	32.4	ACRES	CYCLONE/HAND	N/A	LABOR	PER	ACRE	32.4	$ 16.00	$ 518.40
HEAP LEACH PAD- Top										
Rip/catchment	68.9	ACRES	D10N	1.13	ACRES	PER	HOUR	61.0	$ 148.00	$ 9,024.07
Seed	68.9	ACRES	N/A	2.25	QUARTS	PER	ACRE	155.0	$ 11.00	$ 1,705.28
Broadcast seed	68.9	ACRES	CYCLONE/HAND	N/A	LABOR	PER	ACRE	68.9	$ 16.00	$ 1,102.40
HEAP LEACH PAD- Slopes										
Neutralize	N/A	N/A	N/A	N/A	Part of chemical reclamation	N/A	N/A	0.0	$ 0.00	$ 0.00
Stabilize slopes	524,317	CUBIC YARDS	D10N	1,100	CUBIC YARDS	PER	HOUR	476.7	$ 175.00	$ 83,414.07
Seed	1,950	ACRES	N/A	2.25	QUARTS	PER	ACRE	4,386.5	$ 11.00	$ 48,251.35
Broadcast seed	1,950	ACRES	CYCLONE/HAND	N/A	LABOR	PER	ACRE	1,949.5	$ 16.00	$ 31,192.79
PROCESS FACILITY AREA										
Neutralize	N/A	N/A	N/A	N/A	Part of chemical reclamation	N/A	N/A	0.0	$ 0.00	$ 0.00
Remove liner	N/A	N/A	LUMP SUM	N/A	N/A	N/A	N/A	1.0	$ 5,000.00	$ 5,000.00
Rip concrete	0.52	ACRES	D10N	1.13	ACRES	PER	HOUR	0.6	$ 148.00	$ 86.38
Load & haul concrete	1,667	CUBIC YARDS	TRUCK	40	CUBIC YARDS	PER	TRIP	42.0	$ 200.00	$ 8,400.00
Remove fences	3,978	feet		N/A	COST	PER	FOOT	3,978.0	$ 1.00	$ 3,978.00
Rip/catchment	24	ACRES	D10N	1.13	ACRES	PER	HOUR	21.2	$ 148.00	$ 3,143.36
Spread topsoil	6,455	CUBIC YARDS	631 SCRAPER	527	CUBIC YARDS	PER	HOUR	12.2	$ 198.00	$ 2,425.08
Seed	24	ACRES	N/A	2.25	QUARTS	PER	ACRE	54.0	$ 11.00	$ 594.00
Broadcast seed	24	ACRES	CYCLONE/HAND	N/A	LABOR	PER	ACRE	24.0	$ 16.00	$ 384.00
LIME BIN AREA & FRESH WATER POND										
Drill & Blast Concrete	144	CUBIC YARDS	N/A	N/A	COST	PER	CUBIC YARD	144.0	$ 8.00	$ 1,152.00
Load & haul concrete	144	CUBIC YARDS	TRUCK	40	CUBIC YARDS	PER	TRIP	4.0	$ 200.00	$ 800.00
Remove fences	1,000	feet	N/A	N/A	COST	PER	FOOT	1,000.0	$ 1.00	$ 1,000.00
Rip/catchment	9	ACRES	D10N	1.13	ACRES	PER	HOUR	8.0	$ 148.00	$ 1,178.76
Spread topsoil	2,420	CUBIC YARDS	631 SCRAPER	527	CUBIC YARDS	PER	HOUR	4.6	$ 198.00	$ 909.40
Seed	9	ACRES	N/A	2.25	QUARTS	PER	ACRE	20.3	$ 11.00	$ 222.75
Broadcast seed	9	ACRES	CYCLONE/HAND	N/A	LABOR	PER	ACRE	9.0	$ 16.00	$ 144.00
WASTE ROCK STOCKPILES										
Rip/catchment	419	ACRES	D10N	1.13	ACRES	PER	HOUR	370.8	$ 148.00	$ 54,877.88
Spread topsoil	112,687	CUBIC YARDS	631 SCRAPER	527	CUBIC YARDS	PER	HOUR	213.8	$ 198.00	$ 42,337.80
Seed	419	ACRES	N/A	2.25	QUARTS	PER	ACRE	942.8	$ 11.00	$ 10,370.25
Broadcast seed	419	ACRES	CYCLONE/HAND	N/A	LABOR	PER	ACRE	419.0	$ 16.00	$ 6,704.00
Stabilize slopes	775,518	CUBIC YARDS	D10N	1,100	CUBIC YARDS	PER	HOUR	705.0	$ 175.00	$ 123,377.86

COSTS FOR PHYSICAL RECLAMATION										
ACTIVITY	**QUANTITY**	**UNIT**	**EQUIPMENT**	**QUANTITY**	**RATE**	**PER**	**UNIT**	**UNIT QUANTITY**	**UNIT COST ($)**	**TOTAL COST ($)**
SOIL STOCKPILES										
Rip/catchment	30	ACRES	O10N	1.13	ACRES	PER	HOUR	26.5	$ 148.00	$ 3,929.20
Seed	30	ACRES	N/A	2.25	QUARTS	PER	ACRE	67.5	$ 11.00	$ 742.50
Broadcast seed	30	ACRES	CYCLONE/HANO	N/A	LABOR	PER	ACRE	30.0	$ 16.00	$ 480.00
OFFICE/MAINTENANCE/PARKING/EMERGENCY POWER AREA										
Salvage structures/facilities	N/A	N/A	NO COST	N/A	N/A	N/A	N/A	N/A	$ 0.00	$ 0.00
Remove fences	500	feet	N/A	N/A	COST	PER	FOOT	500.0	$ 1.00	$ 500.00
Rip concrete- OFFICE	0.33	ACRES	O10N	1.13	ACRES	PER	HOUR	0.4	$ 148.00	$ 55.19
Load & haul concrete- OFFICE	1,050	CUBIC YAROS	TRUCK	40	CUBIC YARDS	PER	TRIP	27.0	$ 200.00	$ 5,400.00
Drill & Blast Concrete- SHOP	2,570	CUBIC YARDS	N/A	N/A	COST	PER	CUBIC YARO	2,570.0	$ 8.00	$ 20,560.00
Load & haul concrete- SHOP	2,570	CUBIC YARDS	TRUCK	40	CUBIC YAROS	PER	TRIP	65.0	$ 200.00	$ 13,000.00
Rip/catchment	18	ACRES	O10N	1.13	ACRES	PER	HOUR	15.9	$ 148.00	$ 2,357.52
Spread topsoil	4,841	CUBIC YARDS	631 SCRAPER	527	CUBIC YAROS	PER	HOUR	9.2	$ 198.00	$ 1,818.81
Seed	18	ACRES	N/A	2.25	QUARTS	PER	ACRE	40.5	$ 11.00	$ 445.50
Broadcast seed	18	ACRES	CYCLONE/HANO	N/A	LABOR	PER	ACRE	18.0	$ 16.00	$ 288.00
HAUL AND MAINTENANCE ROADS										
Rip/grade/contour/catchment	94	ACRES	O10N	1.13	ACRES	PER	HOUR	83.2	$ 148.00	$ 12,311.50
Spread topsoil	25,281	CUBIC YAROS	631 SCRAPER	527	CUBIC YAROS	PER	HOUR	48.0	$ 198.00	$ 9,498.22
Seed	94	ACRES	N/A	2.25	QUARTS	PER	ACRE	211.5	$ 11.00	$ 2,326.50
Broadcast seed	94	ACRES	CYCLONE/HANO	N/A	LABOR	PER	ACRE	94.0	$ 16.00	$ 1,504.00
DRAINAGE DIVERSION- Permanent										
Construct Oiversions	N/A	N/A	N/A	N/A	Part of mining	N/A	N/A	0.0	$ 0.00	$ 0.00
Seed	44	ACRES	N/A	2.25	QUARTS	PER	ACRE	99.0	$ 11.00	$ 1,089.00
Broadcast seed	44	ACRES	CYCLONE/HANO	N/A	LABOR	PER	ACRE	44.0	$ 16.00	$ 704.00
Seedlings	44	ACRES	N/A	24	PLANTS	PER	ACRE	1,056.0	$ 2.00	$ 2,112.00
Transplant seedlings	1,056	PLANTS	HANO	1		PER	TRANSPLANT	1,056.0	$ 5.00	$ 5,280.00
Irrigation	1,056	PLANTS	HAND	8	TRIPS	PER	PLANT	8,448.0	$ 5.00	$ 42,240.00
INDIAN PASS ROAD REALIGNMENT- Temporary										
Grade berms	1	HOUR	O10N	1		PER	HOUR	1.0	$ 148.00	$ 148.00
Rip/grade/contour/catchment	7	ACRES	D10N	1.13	ACRES	PER	HOUR	6.2	$ 148.00	$ 916.81
Spread topsoil	7	CUBIC YARDS	631 SCRAPER	527	CUBIC YAROS	PER	HOUR	0.0	$ 198.00	$ 2.63
Seed	7	ACRES	N/A	2.25	QUARTS	PER	ACRE	15.8	$ 11.00	$ 173.25
Broadcast seed	7	ACRES	CYCLONE/HANO	N/A	LABOR	PER	ACRE	7.0	$ 16.00	$ 112.00
PERIMETER & MICROPHYLL FENCE										
Remove fences	43,505	feet	N/A	N/A	COST	PER	FOOT	43,505.0	$ 1.00	$ 43,505.00
POWERLINE/WATER WELLS/PIPELINE										
Salvage structures/facilities	N/A	N/A	NO COST	N/A	N/A	N/A	N/A	N/A	$ 0.00	$ 0.00
Remove fences	800	feet	N/A	N/A	COST	PER	FOOT	800.0	$ 1.00	$ 800.00
Rip concrete	0.50	ACRES	O10N	1.13	ACRES	PER	HOUR	0.6	$ 148.00	$ 83.62
Load & haul concrete	807	CUBIC YARDS	TRUCK	40	CUBIC YAROS	PER	TRIP	21.0	$ 200.00	$ 4,200.00
Ahandon Wells	4	WELLS	LUMP SUM	N/A	N/A	N/A	N/A	1.0	$ 5,000.00	$ 5,000.00
Rip/catchment	29	ACRES	D10N	1.13	ACRES	PER	HOUR	25.7	$ 148.00	$ 3,798.23
Spread topsoil	7,799	CUBIC YARDS	631 SCRAPER	527	CUBIC YAROS	PER	HOUR	14.8	$ 198.00	$ 2,930.30
Seed	29	ACRES	N/A	2.25	QUARTS	PER	ACRE	65.3	$ 11.00	$ 717.75
Broadcast seed	29	ACRES	CYCLONE/HANO	N/A	LABOR	PER	ACRE	29.0	$ 16.00	$ 464.00
SUPERVISION										
Supervision									7%	$ 45,357.56
TOTAL										$ 694,504.53

Table 8: Heap Neutralization Cost Calculation Table

Step	Activity	Unit	Unit Cost	Quantity	Total Cost
Heap Rinsing	Labor	Month	$ 11,403.00	24	$ 273,672.00
	Solution Pump Power	Month	$ 28,825.00	24	$ 691,800.00
	Well Pump Power	Month	$ 178.00	24	$ 4,272.00
	Pump Parts	Month	$ 513.00	24	$ 12,312.00
	Piping	Month	$ 419.00	24	$ 10,056.00
Total Heap Rinsing Cost					$ 992,112.00
Heap Sampling	Drilling and Labor	Feet	$ 20.00	17,400	$ 348,000.00
	Cyanide Sampling	Sample	$ 60.00	300	$ 18,000.00
	Metals Sampling	Sample	$ 190.00	30	$ 5,700.00
Total Heap Sampling Cost					$ 371,700.00
Leachate Evaporation	Labor	Month	$ 11,403.00	16	$ 182,448.00
	Pump Power	Month	$ 28,825.00	16	$ 461,200.00
	Pump Parts & Replacements	Month	$ 513.00	16	$ 8,208.00
	Piping	Month	$ 419.00	16	$ 6,704.00
Total Leachate Evaporation Cost					$ 658,560.00
Pond Residue Sampling	Cyanide Sampling	Sample	$ 60.00	6	$ 360.00
	Metals Sampling	Sample	$ 190.00	6	$ 1,140.00
	Labor	Lump Sum			$ 100.00
Total Process Pond Reclamation Cost					$ 1,600.00
Final Closure Report		Lump Sum			$ 15,000.00
Total Closure and Report Costs					$ 2,038,972.00
Present Value		Years	10%	20	$ 303,072.80

ATTACHMENT A

MONITORING RESULTS FOR SPRING 1995, PICACHO MINE, IMPERIAL COUNTY, CALIFORNIA

MONITORING RESULTS FOR SPRING 1995

PICACHO MINE

IMPERIAL COUNTY, CALIFORNIA

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June 1995

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1.0 INTRODUCTION

This report compiles and presents the results of the revegetation monitoring program at the Picacho Mine Site 2 after the third complete growing season. The monitoring surveys were conducted on April 11 through 13, 1995. The program was initiated in the winter 1991/92. The monitoring provided quantitative vegetation and substrate analysis of the Site 2 heap leach pad and comparable sites in undisturbed areas with native vegetation. This was done with an eye toward determining the "success" of the revegetation testing areas on Site 2. Success, as required by the Picacho Mine Reclamation Plan, cited in the Monitoring Program of Mitigation Measures, is one-third of a plant cover of three percent (which was measured against a standard based on comparable native vegetation). Recent standards at other nearby mines in the desert require not only plant cover, but also density of perennials, and diversity (number of different species). The monitoring results will also be compared to these vegetation parameters.

The purpose of this monitoring was two fold: (1) to compare the current conditions for vegetation growth on Site 2 to the off site native areas and (2) to provide further data for establishing the progress of the revegetation program. The important vegetation growth parameters of interest in revegetation are total plant cover, density of perennial shrubs and trees, and a measure of the plant diversity (numbers of different kinds of plant species). Since these vegetation parameters may be related to substrate, topographic position, and erosional factors, we also recorded these abiotic variables in each transect. Moisture was not a major differentiating factor during this season of abundant rains.

2.0 BACKGROUND

The Site 2 on the Picacho Mine is the site of a former heap leach pad that has been decommissioned. It is in the process of being reclaimed as part of the Picacho Mine Reclamation Plan. The heap was graded to reduce the sideslopes and form moisture enhancement basins in 1991. In winter 1991 and spring 1992, locally collected seed from native vegetation was sown into plots in many of the basins. About 110 plants were transplanted in the basins throughout Site 2. An ironwood seedling nursery had been started in 1992 on the top of Site 2 by placing ironwood seeds directly into the soil. To date, no seedlings have emerged and we have determined that this quick and non-intensive method of ironwood establishment is unsuccessful for ironwood tree replacement.

Two more heap leach pads have been reclaimed, Site 1 (in late 1992 to early 1993) and Site 3 (in late

1993 to early 1994). These sites were not quantitatively monitored since not enough time had elapsed for significant revegetative results.

The winter season of 1994/1995 started dry, but in late December through April 1995, several inches of rain fell at the Picacho Mine. Monitoring this season (1994/1995) was for growth and vegetative parameters measured concurrently both on and off site. There was good vegetative growth and high productivity due to the abundant winter rains this growing season, and good growth during the previous two years.

3.0 MONITORING METHODS

The quantitative vegetation survey technique we used was linear coupled plots along long transects. These linear coupled transects consisted of 2 meter by 10 meter plots laid end to end (coupled) along straight compass lines (linear) and oriented parallel to the slopes and gradients. Each transect is made up of ten of these plots. In each plot, vegetative, topographic, and erosion parameters were recorded. The transects were analyzed for the type of vegetation and abiotic factors as they relate to topographic and erosion features.

The quantitative field surveys were conducted April 11 through 15, 1995. The field surveys used were adapted to sample the type of desert vegetation present in the study area and to be useful in estimating cover and determining shrub density. Six transects were located on Site 2, and 6 transects off site in nearby common vegetation types. The locations, number of samples, variables recorded, and data analysis methods were determined as described below.

Sampling Locations: Six transects were located on Site 2, the reclaimed heap leach pad. Two of these were along the top, 2 were on the large north-facing slope, and 1 each on the south-facing and east-facing slopes. On Site 2 the west-facing slope is steep, has an access road, and is smaller than the other slopes and therefore was not surveyed. Linear transects were oriented along gradients on the other three slopes. A 30 meter steel tape was stretched along the transect line to serve as the center line of the transects. A total of 10 contiguous plots (each 2x10 meters) were surveyed at 10 meter intervals. Six transects were located off site (see Figure 3-1, an oblique aerial photograph of the Picacho Mine showing the locations of the monitoring transects). Of the 6 transects off site, 2 were to the higher slopes south of the Picacho Mine Site in the area where the baseline vegetative surveys were conducted in 1992 (see Figure 3-2).

Figure 1 An Aerial View, Looking East, Showing the Prominent Features of the Mine and the Locations of the Sampling Transects (marked with red lines), Picacho Mine.

Four of the off site transects were run to the north of the Picacho Mine Site near Site 2 (see Figure 3-3). Three transects were in tandem from east to west, and the fourth crossed a major wash from south to north.

Number of Samples: 10 plots per linear transect were sampled on each of the 12 transects (6 on site and 6 off site) for a total of 120 plots.

Variables: The variables were chosen to determine vegetation characteristics and to relate aspects of the vegetation with the abiotic environment. The variables in the transects measured for vegetation were:

- percent cover by each plant species;
- total percent vegetative cover (vegetative litter, rock, and bare ground); and
- total number and average size of shrubs.

The topographic variables measured were:

- degree of slope and aspect;
- percent ground covered by sideslope, basin bottom, or interbasin on Site 2 or by slope or wash off site; and
- an estimated erosion factor determined by a scaler as follows:

  0 = no soil movement
  1 = moderate to severe erosion
  2 = light to moderate erosion
  3 = stasis - equal erosion and deposition
  4 = light to moderate deposition
  5 = moderate to severe deposition

The percent cover of each plant species within each 2 x 10 meter plot was determined by a visual estimation technique. All the plant of one species were identified, then visually grouped to provide a percent of the cover within the 20 square meter plots. Shrubs were counted in each plot. An average shrub height and diameter for each shrub species was measured or estimated for each plot. The aspect and degree of slope was measured with a Brunton compass. Total percent vegetative cover was also visually estimated; with the rock, vegetative litter, and bare ground estimates adding up to 100% ground cover. Surface erosion was a qualitative factor estimated for each plot.

Figure 3-2 Off site monitoring area to the south of the Picacho Mine, April 1995. (see Figure 3-1 for location)

Figure 3-3 Off site monitoring area to the north of the Picacho Mine, April 1995. (see Figure 3-1 for location)

4.0 MONITORING RESULTS

The results of the monitoring for the common vegetation parameters of cover, density, and diversity are presented and discussed in this section. These vegetation results are also related to topographic and erosion factors where a relationship was determined by the plots sampled. In some cases, no strong correlation or relationship could be determined. The vegetation on the site is compared to off site conditions for a determination of revegetation success.

4.1 Plant and Ground Cover

The results of the vegetative and ground cover monitoring are presented in Table 4-1. Rock cover and bare ground were uniform over Site 2 at approximately 35% cover each, therefore these measurements were not recorded individually. The average total vegetative cover was higher on the reclaimed Site 2 at 20%, than the off site native vegetation at 12%. See Figures 4-1 and 4-2 for the general type of vegetation growing on the revegetated Site 2, and refer back to Figure 3-2 and 3-3 for general views of the off site areas monitored.

The higher plant cover on the reclaimed site is partly the result of (1) better soil conditions of nutrient status and texture, (2) lack of rock or rock outcrop, and (3) the better moisture conditions in the basins which retain rain in the soil. The plant species planted and seeded on Site 2 have responded well to recent rains, especially the annuals. Off site soils are highly weathered, rocky (average of 75% rock cover), lacking in nutrients, and do not retain soil moisture. These off site soil conditions are reflected in the lower plant growth, hence lower total plant cover. It is expected that this difference in plant cover between Site 2 and off site will persist, but will be less prominent in years of low rainfall. This is because there were fewer perennial shrubs on Site 2 compared to off site and annuals contribute less cover during years of low rainfall.

4.2 Plant Diversity and Density

The density of perennial shrubs and herbaceous perennials averaged 160 shrubs per acre on Site 2, and 430 shrubs per acre off site (see Table 4-2). The density of shrubs has been increasing on Site 2 during the past two years, and the trend is for more perennials to become established as the vegetation matures. However, at the present time, there is 37% (number shrubs on Site 2 divided by number of shrubs offsite times 100) of the offsite density on Site 2 compared to off site. Numbers of species per plot (as a measure of diversity) averaged 9.2 on Site 2 transects, and 8.5 on off site transects. These are similar

Table 4-1 Summary of Cover Results, Revegetation Program, Picacho Mine				
Transect number	Plant cover	Litter cover	Rock cover	Bare ground
SITE 2				
1	19	12	--	--
2	21	10	--	--
3	24	12	--	--
4	18	6	--	--
5	20	9	--	--
6	19	11	--	--
average	20	10	35	35
OFF SITE				
7	15	5	63	17
8	14	5	65	16
9	9	3	86	1
10	9	3	84	4
11	15	4	73	8
12	11	3	82	4
average	12	4	76	8

Figure 4-1 Revegetation basins on Site 2, reclaimed heap leach pad, Picacho Mine, April 1995.

Figure 4-2 Seeded plots on Site 2 leach heap pad showing perennial shrubs growth after two seasons, Picacho Mine, April 1995.

Table 4-2 Summary of Shrub Density and Species Diversity Results, Revegetation Program, Picacho Mine, April 1995			
Transect number	Shrub density		Species diversity
	shrubs/hectare	shrubs/acre	
SITE 2			
1	600	240	6.7
2	450	180	8.4
3	1,000	400	10.7
4	0	0	8.6
5	100	40	9.6
6	200	80	11.0
average	390	160	9.2
OFF SITE			
7	1,450	580	8.7
8	2,450	980	6.7
9	1,350	540	9.8
10	400	160	8.9
11	450	180	9.5
12	300	120	7.3
average	1,070	430	8.5

diversities, although the kinds of species differ due to the successional status of plant growth on Site 2 (see Section 4.3).

A count of all perennial plants present in each basin that our transects crossed was recorded. A total of 43 basins on Site 2 were crossed, 109 perennials (12 species, mostly *Encelia farinosa* - inciensio) were counted. This count included surviving transplants of *Ferocactus cylindraceus* (barrel cactus) and *Opuntia acanthocarpa* (buckhorn cholla). Assuming an average basin size of 5,000 square feet, this is a perennial plant density of 55 plants per hectare (22 plants per acre) in the basins. This is less than the 160 shrubs per acre measured overall on Site 2 (indicating most of the shrubs are on slopes and banks outside the

basins).

The numbers and density of shrubs was more variable than total plant cover and could not be related to slope or aspect on either Site 2 or off site. The most conspicuous factor that may control shrub density is the lack of time for shrubs to become established on Site 2, and the absence of drainage patterns. There were large clumps of shrubs with intervening bare areas off site. Shrubs were noted to be denser on the sides and bottoms of shallow washes off site, but this was difficult to determine in the linear plots.

4.3 Comparison of Plant Species Composition

Plant cover by species is presented in Table A-1 (given in Appendix A). An analysis of this table for the type of plant species showed that out of the 57 recorded in the transects, there were 34 total species recorded on Site 2 versus 38 species recorded off site. However, there were only 15 species common to Site 2 and off site. The dominant species for cover on Site 2 were annuals, principally *Eriogonum deflexum* (flat-topped buckwheat), *Gilia latifolia* (gilia), *Chaenactis fremontii* (fremont's pincushion), and *Baileya pauciradiata* (desert marigold). Off site the dominant species for cover were the shrubs *Encelia farinosa* (inciensio) and *Larrea tridentata* (creosote bush), and a variety of annuals with the most abundant being *Plantago patagonica* (plantain).

The main difference in the plant species on the reclaimed Site 2 as compared to off site was that; annual diversity and density were higher on Site 2, while shrub and herbaceous perennial numbers were greater off site. Additionally, shrubs on Site 2 were smaller and more widely dispersed.

4.4 Topographic and Erosional Factors

There were differences in erosion on site and off site. The on site erosion was greater, however sediment erosion and deposition were equal so that very little material was transported off Site 2. The catchment basins controlled most of the sediment. The plant density and cover was not affected by the more active erosion, nor were plants a large factor in controlling erosion. The rain storm in December 1994 had breached the lower banks in some of the moisture catchment basins, however, plant species grew equally well on all aspects of the heap leach pad. There were no consistent recorded differences in plant species cover or diversity related to erosion.

Erosion off site was minimal in the transects recorded. These off site areas were adjusted for land form

and topography such that the recent rains did not cause much erosion. Much of the surfaces were either rock outcrop or had large rocks armoring the soil. The plant cover at an average of 12% also did not control erosion. Differences in plant species present were related to the type of soil substrate and rock surface, and were most pronounced in the broad washes. The complex relationship of the mature native vegetation communities types and patterns to substrate and topography is beyond the scope of this monitoring report.

4.5 Floristics

An analysis was conducted of the kinds of plant species (floristics) that have germinated and grow on Site 2 are compared to the off site plant species. A floristics list for the Picacho Mine area is presented in Table A-2 (given in Appendix A). The scientific nomenclature for the species is according to The Jepson Manual: Higher Plants of California, 1993, James C Hickman, editor, University of California Press, Berkeley and Los Angles, California. The plant species that grow both on the Picacho Mine and in the surrounding lands are typical for the hot desert regions of California. This area of the desert is a portion of the Sonoran Desert (also called Colorado Desert) that covers southeastern California and adjacent parts of Arizona and Mexico. There were no unusual plant species observed or collected on or in the vicinity of the mine. The dominant perennial plant are drought resistant shrubs, with annual growth abundant in years of good precipitation. This season was unusual in the numbers and kinds of herbaceous annual that germinated and produced good vegetative growth.

5.0 SUMMARY

The standard required for reclamation success at the Picacho Mine, according to the "Monitoring Program of Mitigation Measures", is for overall cover to be one percent, or one third the baseline of three percent plant cover. This standard is easily met by Site 2. This monitoring period was conducted during a period of more abundant rains, hence plant growth and cover was greater on Site 2, and comparable to concurrently measured off site plant cover.

Other mines in the area have more restrictive reclamation standards than those at Picacho Mine. Those standards require 35% of total vegetative cover, 21% of the perennial densities, and 15% of the diversity compared to representative off site native vegetation. These more restrictive standards are also met with the current Site 2 reclamation progress.

Site 2, by these standards, can be considered to be successfully reclaimed after three growing seasons. This growing period has had significant amounts of rain during two of the three years of the revegetation program. However, the trends in vegetation growth and productivity are well established, and the site has a topography and soil that will continue to promote and support a good vegetation.

APPENDIX A

Table A-1 Plant Cover by Species, Site 2 and Offsite, Picacho Mine, April 1995														
TRANSECT NUMBER	**1**	**2**	**3**	**4**	**5**	**6**	**Site 2**	**7**	**8**	**9**	**10**	**11**	**12**	**Offsite**
TREES AND TALL SHRUBS														
Cercidium floridum	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0.033
Olneya tesota	0	0	0	0	0	0	0	0	0	0	0	2.1	0	0.35
SHRUBS														
Ambrosia dumosa	0	0	+	0	0	+	+	0	+	0	0	0.3	0	0.06
Asclepias subulata	0	0	0	0	0	0	0	+	0.1	0	0	0	0	0.02
Bebbia juncea	0	0	0.3	0	0	0	0.05	0.2	0	0	0	0.2	0	0.05
Encelia farinosa	0.1	0	1.5	0	+	+	0.4	2.0	1.7	2.7	1.3	0.6	0.6	1.483
Fouquieria splendens	0	0	0	0	0	0	0	1.2	0	0	0	0	0	0.2
Larrea tridentata	0	0	0	0	0	0	0	2.1	2.5	0.2	0	0	4.3	1.517
Psorothamnus schotti	0	0	0	0	0	0	0	0	0	0	+	0	0	+
Stephanomeria pauciflora	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0.033
GRASSES														
Aristida adscensionis	0	0	0	0	0	0	0	0	0	0	0	+	0	+
Bromus madritensis	0	+	+	0.1	0	0.2	0.075	0	+	0.1	+	0.6	+	0.233
Vulpia octoflora	0	0	0	0	0	0	0	0	+	0	0	0	0	+

Table A-1 Plant Cover by Species, Site 2 and Offsite, Picacho Mine, April 1995														
TRANSECT NUMBER	1	2	3	4	5	6	Site 2	7	8	9	10	11	12	Offsite
HERBACEOUS PERENNIALS AND ANNUALS														
Atrichoseris platyphylla	0	0	0	0	0	0	0	+	0	0	0	0	0	+
Baileya pauciradiata	1.9	4.7	5.2	1.6	2.0	0.4	2.633	0	0	0	0	0	0	0
Camissonia boothii	0	0	0	0	0	0	0	0	0	0.	0	+	0	+
Camissonia brevipes	0	0.3	0.7	1.1	2.3	0.2	0.767	0	0	0	0	0	0	0
Camissonia claviformis	0	0	0	0	0	+	+	0	0	0	0	0	0	0
Caulanthus cooperi	0.9	0.3	1.0	+	0.3	0.2	0.54	0	0	0	0	+	0	+
Chaenactis fremontii	1.4	3.0	3.1	2.3	2.5	1.4	2.283	1.3	1.2	0.9	1.1	1.2	0.8	1.083
Chorizanthe brevicornu	0.8	0.7	0.6	0.7	1.0	0.6	0.733	1.3	0.8	0.2	0.4	3.2	0.7	1.1
Chorizanthe rigida	0.3	+	+	0	0	0	0.075	0.1	+	+	+	+	0.1	0.1
Cryptantha circumscissa	0.1	0.1	1.4	0.4	0.6	2.0	0.767	0.5	0.3	0.6	+	0.3	0.3	0.4
Cryptantha micrantha	0	0	0	0	0	+	+	0	0	0	0	0	0	0
Dalea mollis	0	0	0	0	0	+	0	0.1	0.1	0	0	0	0	0.033
Eremalche rotundifolia	0	0	0	0	0	+	+	0	0	0	0	0	0	0
Eriogonum deflexum	8.3	7.9	4.3	5.7	6.6	4.5	6.217	0.2	0	+	0	0	0	0.04
Eriogonum inflatum	0	0.2	0	0	0	0	0.033	0	0	0	0	0	0	0
Eriogonum nidularium	+	0.1	+	0.1	+	0.1	0.1	0	0	+	+	+	+	+
Eriogonum trichopes	0	0	0	0	0	0	0	0	+	0.7	1.6	0.5	0.2	0.6

Table A-1 Plant Cover by Species, Site 2 and Offsite, Picacho Mine, April 1995														
TRANSECT NUMBER	**1**	**2**	**3**	**4**	**5**	**6**	**Site 2**	**7**	**8**	**9**	**10**	**11**	**12**	**Offsite**
Erodium circutarium	0	0	0	0	0	+	+	0	0	0	0	0	0	0
Eschscholtzia minutiflora	0	0	0	0	0	0	0	0	0	0	+	0.4	0	0.08
Euphorbia eriantha	0	0	0	0	0	0	0	0	+	+	+	+	+	+
Fagonia pachyacantha	0.9	0.8	1.8	1.7	1.3	2.1	1.433	0.8	0.2	1.7	3.0	1.6	0	1.217
Gilia latifolia	2.6	2.3	2.0	2.5	1.2	5.2	2.633	0	0	0.2	0	0	+	0.04
Hibiscus denudatus	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0.083
Langloisia setosissima	0	0	+	0	0	0	+	+	0.1	+	+	0.1	0	0.067
Lepidium lasiocarpum	0	0	0	0	0	0	0	0	0	0	0	0.3	+	0.06
Lotus sp.	+	+	0	0	0	0	+	0	0	0	0	0	0	0
Lupinus sp.	0	0	0	0	0	0	0	+	0	0	+	+	0.1	0.033
Malacothrix californica	0	0	0	0	0	+	+	0	0	0	0	0	0	0
Mentzelia albicaulis	0	0	0	0	0	0	0	+	0	0.4	0	+	+	0.133
Mohavea confertifolia	0	0	0	0	+	0	+	0	0	0	0	0	0	0
Monoptilon bellioides	0	0	0	0	+	0.1	0.02	0	0	0	0	0	0	0
Oligomeris linifolia	0.4	0.3	0.6	1.0	0.8	0.2	0.55	0	0	+	0	+	+	+
Perityle emoryi	0.4	0.3	1.2	1.1	0.9	0.5	0.733	0.2	+	+	0.1	1.5	+	0.6
Petalonyx therburi	0	0	+	0	0	0	+	0	0	0	0	0	0	0
Phacelia crenulata	0	0	0	0	0	+	+	0	0	0	0	0	0	0

Table A-1 Plant Cover by Species, Site 2 and Offsite, Picacho Mine, April 1995														
TRANSECT NUMBER	**1**	**2**	**3**	**4**	**5**	**6**	**Site 2**	**7**	**8**	**9**	**10**	**11**	**12**	**Offsite**
Phacelia fremontii	0.2	0.1	0.4	0	0.3	0.8	0.3	0.3	+	0.8	0.3	0.2	+	0.4
Plantago patagonica	0	0	0	0	0	+	+	4.3	6.2	0.7	0.6	2.3	3.3	2.9
Psathyrotes ramosissima	0	+	+	0	0.2	0	0.05	0	0	0	0	0	0	0
Sonchus arvensis	0	0	0	+	0	0	+	0	0	0	0	0	0	0
Stephanomeria spinosa	0.1	0	0	0	0	0	0.017	0	0	0	0	0	0	0
CACTUS														
Ferocactus cylindraceus	0.1	0	+	0	0	0	0.02	0	0	0	0	0	0	0
Opuntia basilaris	0	0	0	0	0	0	0	0	0.4	0	0	0	0	0.067
Total	1.9	2.1	2.4	1.8	2.0	1.9	2.017	1.5	1.4	0.9	0.9	1.5	1.1	1.217

Table A-2 List of Plant Species Observed at Picacho Mine, April 1995	
Scientific Name	**Common Name**
Trees and Tall Shrubs	
Cercidium floridum	palo verde
Dalea spinosa	smoke tree
Olneya tesota	desert ironwood
Phoradendron californicum	mistletoe (parasitic on trees)
Prosopis glandulosa	honey mesquite
Tamarix ramosissima	tamarisk
Shrubs	
Acacia greggii	catsclaw
Ambrosia dumosa	burrobush
Asclepias subulata	milkweed
Atriplex canescens	four-wing saltbush
Atriplex hymenelytra	desert holly
Atriplex polycarpa	cattle spinach
Bebbia juncea	sweetbush
Calliandra eriophylla	fairy duster
Ditaxis lanceolata	lance-leaved ditaxis
Encelia farinosa	inciensio
Fouquieria splendens	ocotillo
Hibiscus denudatus	pale face
Hymenoclea salsola	cheesebush
Hyptis emoryi	desert lavender
Isocoma acradenia	goldenbush
Krameria grayi	desert ratany
Larrea tridentata	creosote bush
Lotus scoparius	california broom

Table A-2 List of Plant Species Observed at Picacho Mine, April 1995	
Scientific Name	**Common Name**
Lycium andersonii	box thorn
Petalonyx thurberi	sandpaper plant
Peucephyllum schottii	pigmy cedar
Psorothamnus schottii	indigo bush
Stephanomeria pauciflora	wire lettuce
Grasses (perennial species noted with *)	
Aristida adscensionis	three-awn
*Aristida californica**	California three-awn
*Bouteloua barbata**	grama grass
Bromus madritensis	red brome
Erioneuron pulchellum	fluff grass
*Pleuraphis rigida**	big galleta
Schismus arabicus	tufted grass
Schismus barbatus	mediterranean grass
Vulpia octoflora	six-week fescue
Herbs (perennial species noted with *)	
Ambrosia psilostachya	western ragweed
Atrichoseris platyphylla	gravel-ghost
Baileya pauciradiata	desert marigold
Boerhavia wrightii	spiderling
Camissonia boothii	booth's evening primrose
Camissonia brevipes	evening primrose
Camissonia claviformis	club evening primrose
Caulanthus cooperi	jewelflower
Chaenactis carphoclinia	pebble pincushion
Chaenactis fremontii	fremont's pincushion

Table A-2 List of Plant Species Observed at Picacho Mine, April 1995	
Scientific Name	**Common Name**
Chaenactis stevioides	chaenactis
Chamaesyce polycarpa	prostrate spurge
Chamaesyce melanadenia	prostrate spurge
Chorizanthe brevicornu	brittle spine-flower
Chorizanthe corrugata	corrugata
Chorizanthe rigida	spiny chorizanthe
Cryptantha circumscissa	western forget-me-not
Cryptantha holoptera	winged cryptantha
Cryptantha recurvata	cryptanthe
Dalea mollis	soft indigo
Datura meteloides	western jimson weed
Eremalche rotundifolia	desert five-spot
Eriastrum eremicum	desert eriastrum
*Eriogonum deflexum**	flat-topped buckwheat
*Eriogonum inflatum**	desert trumpet
Eriogonum nidularium	whisk broom
Eriogonum trichopes	little trumpet
Erodium circutarium	storksbill
Eschscholtzia glyptosperma	desert gold poppy
Eschscholtzia minutiflora	little gold poppy
Euphorbia eriantha	beetle spurge
*Fagonia laevis**	smooth-stemmed fagonia
*Fagonia pachyacantha**	fagonia
Geraea canescens	desert sunflower
Gilia spp.	gilia
Gilia latifolia	gilia

Table A-2 List of Plant Species Observed at Picacho Mine, April 1995	
Scientific Name	**Common Name**
Langloisia setosissima	langloisia
Lepidium lasiocarpum	peppergrass
Lepidium nitidum	peppergrass
Lotus sp.	lotus
Lupinus sp.	Lupine
Malacothrix californica	desert dandelion
Mentzelia sp.	
Mentzelia albicaulis	small-flowered blazing star
Mentzelia involucrata	sand blazing star
Mohavea confertifolia	ghost flower
Mirabilis bigelovii	four o'clock
*Mirabilis tenuiloba**	long-lobed four o'clock
Monoptilon bellioides	desert star
Nemacladus glanduliferus	thread plant
Oenothera villosa	evening primrose
Oligomeris linifolia	linear-leaved cambess
Palafoxia linearis	spanish needles
Perityle emoryi	rock daisy
*Petalonyx thurberi**	sandpaper plant
Phacelia campanularia	campanulate phacelia
Phacelia crenulata	notch-leaved phacelia
Phacelia fremontii	fremont phacelia
Phacelia tanacetifolia	lacy phacelia
Physalis crassifolia	ground cherry
Plantago ovata	plantain
Plantago patagonica	plantain

Table A-2 List of Plant Species Observed at Picacho Mine, April 1995	
Scientific Name	**Common Name**
*Psathyrotes ramosissima**	turtleback
*Sarcostemma hirtellum**	rambling milkweed
Sonchus arvensis	perennial sow thistle
Sonchus asper	prickly sow thistle
*Sphaeralcea emoryi**	orange globemallow
*Stephanomeria spinosa**	wire lettuce
*Trixis californica**	trixis
Cactus	
Ferocactus cylindraceus	barrel cactus
Mammilaria tetrancistra	nipple or fishhook cactus
Opuntia acanthocarpa	buckhorn cholla
Opuntia basilaris	beavertail cactus
Opuntia ramosissima	pencil cactus

(Nomenclature according to The Jepson Manual, 1993)

ATTACHMENT B

MONITORING RESULTS FOR FALL 1996, PICACHO MINE, IMPERIAL COUNTY, CALIFORNIA

MONITORING RESULTS FOR FALL 1996

PICACHO MINE

IMPERIAL COUNTY, CALIFORNIA

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1.0 INTRODUCTION

This report presents the results of the revegetation monitoring survey conducted on December 13 and 14, 1996, at the Picacho Mine Leach Pad Sites 2 and 3 after the fourth complete growing season (winter/spring 1991/92 to fall/winter 1996). This survey was conducted at the end of an 18 month drought period with little plant growth and no germination. This survey complements the monitoring survey completed on April 11 through 13, 1995, after an excellent growing season with abundant rain. In addition to Site 2, Site 3 was added to this survey to determine success as a second area of revegetation efforts on the mine site. Both surveys measured the vegetation to determine the "success" of the revegetation testing areas on the mine Sites 2 and 3 with comparable off site areas with native vegetation.

The purpose of this monitoring was; (1) to compare the current conditions after a prolonged drought period for vegetation growth on mine revegetation sites to the off site native areas, and (2) to provide further data for establishing the progress of the revegetation program. Moisture was, in contrast to spring 1995, a critical factor during this climatic period of little rainfall and low moisture. The important vegetation growth parameters of interest in the revegetation testing program are total vegetative plant cover, density of perennial shrubs and trees, and a measure of the plant diversity (numbers of different kinds of plant species).

Success as required by the Picacho Mine Reclamation Plan, cited in the Monitoring Program of Mitigation Measures, is one percent (one-third of a plant cover of three percent as measured against a standard based on comparable native vegetation). Present standards for revegetation at the Picacho Mine require comparison to native undisturbed vegetation for plant cover only. Density of perennials and diversity is not required. However, the monitoring results will again be compared to vegetative cover as well as density and diversity.

Sites 2 and 3 on the Picacho Mine are former heap leach pads that have been decommissioned and have been reclaimed as part of the Picacho Mine revegetation testing program. The heaps were graded to reduce the sideslopes and form moisture enhancement basins (catchment basins) in 1991 and 1992. In winter 1991 and spring 1992, locally collected seeds from native vegetation was sown into plots in many of the basins. In addition, approximately 110 plants were transplanted in the basins throughout Site 2. Ironwood seedlings were

transplanted to various sites on the mine, including Site 3, in 1995. The success of the transplanting program will be discussed below.

2.0 MONITORING METHODS

Quantitative vegetation survey techniques were used similar to those during previous vegetation and monitoring surveys. The techniques used were adapted to sample the desert vegetation present in the study area and to be useful in estimating cover and determining shrub density. Linear coupled transects consisted of 6 feet by 100 feet plots laid end to end (coupled) along straight compass lines (linear) and oriented parallel to the slopes and gradients. The length of the transects was increased from 34 feet (10 meters) to 100 feet because of low plant density and production. Each transect was made up of ten of these plots. Four transects each were located on Sites 2 and 3. Two sets of four transects each were located off site in nearby common undisturbed vegetation types to the north and south of the mine area (see Figure 2.1). In each plot, vegetative variables were recorded. The transects were then analyzed for vegetation parameters.

The locations, number of samples, variables recorded, and data analysis methods were determined as described below:

Sampling Locations: mine site transects were located on reclaimed heap leach pads oriented along gradients on the different facing slopes. A 100 feet tape was stretched along the transect line to serve as the center line of the transects. A total of 10 contiguous plots (each 6x100 feet) were surveyed at each transect. An equal number of transects were located off site; one set of four on the higher slopes south of the Picacho Mine Site in the area where the baseline vegetation surveys were conducted in 1992, and one set to the north in the areas surveyed as a comparable site in 1995 (see monitoring report, Bamberg and Hanne 1995).

Number of Samples: 10 plots per linear transect were sampled on each of the 16 transect lines (8 on site and 8 off site) for a total of 160 plots.

Variables: The variables were chosen to determine vegetation characteristics. Variables in the transects measured for vegetation were:

- percent cover by each plant perennial shrub species;
- total percent vegetative cover (live, standing dead, annual plant cover); and
- total number and size of each shrub or tree.

The few annual plants present were recorded simply as a cover percentage. No topographic variables were measured during these surveys.

The percent cover of each perennial shrub (and tree) species within each linear plot was determined by counting individuals of each species and measuring or estimating the cover size of each. The diameter of each shrub plant was also measured or estimated.

The results of the ironwood tree replacement program was evaluated by counting the number of surviving seedlings. The general conditions and amounts of new growth were qualitatively determined.

3.0 MONITORING RESULTS

The most recent monitoring offered an excellent opportunity to document revegetation results after two consecutive years of drought. Monitoring results for the common vegetation parameters of cover, density, and diversity are presented and discussed in this section. The vegetation on the revegetated mine sites is compared to off site natural vegetation for a determination of relative revegetation success.

Several changes in vegetation were observed between the spring 1995 monitoring and the end of the two year drought period. There was abundant cover of annual plant species on all plots in 1995, however in 1996 there was no observable annual germination or growth on the off site plots. A few annual plants were observed in Sites 2 and 3 catchment basins. These catchment basins collected light rains which totaled approximately 0.25 inches in the last 18 months. Since 1995, there was also very minimal growth on perennial plants, and in most cases the shrubs had die-back of branches or whole plants. This is a typical response to drought in this desert area, as plants quickly respond to available moisture.

Recent use by wildlife was observed on Sites 2 and 3 reclaimed areas. Deer pellets both fresh and old were observed on reclaimed areas. Deer are preferentially utilizing the reclaimed areas, possibly due to more succulent vegetation growing in the moisture catchment basins as compared to off site. Deer clipped annuals and browsed woody species included brittle bush, desert holly, and palo verde. Other animal signs included rabbits (pellets and cutting of

creosote bush stems), small rodents (mice and packrat), lizards, birds, and insects (ant nests). Coyote and/or fox tracks and scat were also common due to abundant prey.

3.1 Revegetation monitoring results

The results of the vegetative and ground cover monitoring are presented in Table 3-1. The average total vegetative cover measured in transects on the reclaimed Site 2 was 0.3% and on Site 3 was 0.2%. This compares to an average 0.6% cover on the lower alluvial flats north off site transects, and a 1.3% average on transects on the upper slopes to the south of the mine site. The slopes to the south of the site had the highest density of perennial shrubs and trees, consequently the highest cover values. As a measure of previous vegetative growth, standing dead plant cover was estimated on all sets of transects. Standing dead plant cover was highest on Site 2 at 14.1%. Standing dead cover on Site 3 at 2.3%. This compares to 2.5% standing dead cover on off site to the north, and 3.3% cover on the south off site transects. Much of the standing dead plants were annuals although some off site shrubs had died or had die-back . Few of the perennials on the mine site were dead.

As expected, the total plant cover on all transects was lower by significant amounts in late 1996 as compared to spring 1995. The plants cover was much lower; from 20% on Site 2 in 1995 compared to 0.3% in 1996, and from 12% off site to an average of 0.9% in 1996. As expected this difference in plant cover between reclaimed sites as compared to off site areas was less prominent after 18 months of low rainfall. This is because there were fewer perennial shrubs on Site 2 compared to off site and annuals contribute less cover during periods of low rainfall.

The density of perennial shrubs and herbaceous perennials in 1996 averaged 74 and 55 shrubs per acre on Sites 2 and 3, respectively (see Table 3-1). Off site the shrubs averaged 310 per acre to the south off site, and 80 per acre to the north (see Table 4-2). These densities were also much lower than the densities measure in 1995 (160 on site, 430 off site) since many of the smaller shrubs were dead or dormant. Some of the perennial species, such as brittle bush and fagonia, are short lived perennials that have high densities in years of abundant moisture.

Table 3-1. Results of the monitoring transects for the Picacho Mine Revegetation program. December 13-14, 1996.

Site location	Transect number	Total live cover (%)	Standing dead (%)	Perennial density (#/acre)	Perennial diversity (#/plot)
Off site - North	1	2.6	3.4	87	0.9
	2	0.7	2.0	58	0.7
	3	0.5	1.6	87	1.1
	4	0.7	2.8	94	1.0
Average		**0.6**	**2.5**	**80**	**0.9**
Off site - South	1	0.8	2.6	145	1.6
	2	1.9	3.2	305	2.1
	3	1.7	4.5	479	2.7
	4	1.4	2.8	312	2.5
Average		**0.3**	**3.3**	**310**	**2.2**
Mine - Site 2	1	0.8	14.3	87	1.2
	2	0.2	14.5	65	0.7
	3	0.1	12.0	58	0.7
	4	0.4	15.5	94	0.9
Average		**0.3**	**14.1**	**74**	**0.9**
Mine - Site 3	1	0.8	2.6	102	1.2
	2	0.1	1.9	51	0.7
	3	0.1	2.3	36	0.4
	4	0.1	2.2	29	0.4
Average		**0.2**	**2.3**	**55**	**0.6**

Numbers of perennial species per plot (as a measure of diversity) averaged 0.8 on mine sites, and 1.6 on off site transects. These were not comparable to 1995 diversity values, since only perennial diversities could be assessed in 1996.

3.2 Results of the ironwood tree replacement program

The ironwood tree replacement program used locally collected seeds to establish seedlings for planting on the project site or in adjacent areas. This program started by establishing seedlings in containers at a nursery in Tucson, Arizona, transporting to the mine site, and transplanting. The procedural methods employed the following sequential steps:

(1) collecting ironwood seeds from the local area,
(2) germinating and growing the seeds in a nursery and greenhouse,
(4) transportation of the seedlings to the Picacho site,
(5) transplanting of the seedlings to their permanent locations ,
(6) protection of the seedlings from grazing and,
(6) watering the seedlings during the first two growing seasons.

A total of 298 seedlings were transplanted into four locations on the projects site in early December, 1995 (see Figure 2.1). The soil and substrate at the transplant locations consisted of rinsed leached ore on Sites 1, 2, and 3, and disturbed soils and mine waste stockpile material at the salvage yard. These soil substrates varied from compacted material around the bases of the heaps to loose spent ore on the sides and tops of the reclaimed ore heaps.

Seedling (4 to 8 inches tall) were transplanted into hand dug holes. The seedlings were removed from the tubes, placed into the holes, and soil previously removed from the hole replaced in and around the root mass. Wire mesh cages enclosed each seedling to a height of 24 inches and was buried 2 to 4 inches into the ground. These cages will stay in place until the seedlings are well established, about 2 to 3 years. The seedlings were watered initially at the time of transplanting by saturating the soil in the transplant sites around the seedlings. A piping system has been constructed and the seedlings have been watered (approximately 5 gallons/plant/watering) every two to three weeks for the first growing season (1996), and will continue to be watered once a month for the next growing season (1997). No supplemental or long termed watering is planned for the seedlings.


SITE 4 PLANT SITE
SITE 4 ORE HEAP (inactive)
Site 1 Reclaimed Ore Heap
Site 2 Reclaimed Ore Heap
Dulcina Ext. pit
ORE-STK DUMP
650
690
Lift 7
SITE 5 ORE HEAP (active)
San George Pit Backfill
790
775
SITE 3 CONTAINMENT
Site drainage
Site drainage
Apache Pit Backfill
Site 3 Reclaimed Ore Heap
Site drainage
North
LEGEND:
Ironwood Trees
1 - 4
Transect Location
Chemgold Inc.
DULCINA PIT - PHASE 2
1996 Transect Locations

Figure 2.1

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for reproduction purposes.

The transplanted ironwood seedlings showed good survival and growth. The survival rate was calculated at 78% (233 out of 298 seedlings) for the period ending in mid-December 1996. Survival appeared to depend on location, soil, and drainage factors. Some mortality was due to washouts in the hard road substrate around Site 2 , and to poor soil conditions around the eastern base of Site 1. Some seedlings near ant nests had leaves stripped. Some ironwood seedling mortality could not be assigned a cause. There was little evidence that seedlings were being eaten or browsed by rodents or herbivores. In general, the seedlings exhibited good growth with stem elongation and branching. Growth on some seedlings, which averaged about 6 inches in height, varied from a few inches to a maximum of about 42 inches on Site 3.

4.0 SUMMARY

Results of the December 1996 monitoring were certainly interesting and provide a good contrast to the previous April 1995 monitoring results. The decrease (measured at about 1300% in the off site plots) in plant cover and observable biomass (total amounts of live vegetation) was very dramatic after this drought period. The standards for reclamation success were again meet despite the drought. This indicates that the reclaimed sites are stable and holding their own.

The standard required for reclamation success at the Picacho Mine, as stated in the "Monitoring Program of Mitigation Measures", is for overall cover to be one percent, or one third the baseline of three percent plant cover as measured 1991. The one percent standard for total plant cover on the reclaimed mine sites was not achieved in 1996. However based on the baseline of 0.9% cover measured off site in the natural vegetation during 1996, the 0.3% cover on site does meet the standard for success. This period preceding the 1996 monitoring had very low rainfall, hence plant growth and cover was less on mine Sites 2 and 3, <u>and</u> off site in the natural vegetation. The standard is met with comparable, and concurrently measured, off site plant cover. It is postulated that in drought periods, recently revegetated and reclaimed areas on the mine site have less cover relative to off site, since perennial plants on reclaimed sites are still small and widely spaced. This difference should be less after several years when more perennials are established on the reclaimed mine sites.

The reclaimed Picacho sites can be considered to be successfully reclaimed after four growing seasons and in spite of a one and one-half year drought. The present monitoring period received much less rain than the first two of the three years of the revegetation program. The relative trends in vegetation growth and productivity on site are well established and comparable to off site vegetation. The reclaimed mine sites have moisture conditions, topography, and soils that will continue to promote and support vegetation productivity.

ATTACHMENT C

STATEMENT OF NOTIFICATION

STATEMENT OF NOTIFICATION

I, the undersigned, have notified all owners of a possessory interest in the land of the proposed use(s) or potential use(s) identified in Section 6.2 of the Reclamation Plan.

Signed this FOURTEENTH day

of JULY, 1997

Operator of Operator's Agent

GLAMIS IMPERIAL CORPORATION

This Statement of Notification was signed before me on July 14, 1997

by Steve Baumann.

OFFICIAL SEAL
VIVIAN R. WILLIAMS
NOTARY PUBLIC, ARIZONA
YUMA COUNTY
My Comm. Expires Apr. 17, 19 99

Vivian R. Williams
Notary Public

ATTACHMENT D

HYDROLOGIC/HYDRAULIC ANALYSES FOR THE WEST PIT AND EAST PIT DIVERSION DITCHES

Chemgold, Inc. - Imperial Project

HYDROLOGIC/HYDRAULIC ANALYSES
FOR
WEST PIT AND EAST PIT DIVERSION DITCHES

May 1997

REGISTERED PROFESSIONAL ENGINEER
JOHN S. HANSON
No. 45764
Exp. 12/31/98
CIVIL
STATE OF CALIFORNIA

JAMES C. HANSON
CONSULTING CIVIL ENGINEER
A CORPORATION
444 N. Third Street, Suite 400
Sacramento, CA 95814
(916) 448-2821

Chemgold, Inc.
Imperial Project

Hydrologic/Hydraulic Analyses for West Pit and East Pit Diversion Ditches

Introduction

Three open pits will be developed in connection with the Imperial Project. A number of significant drainages pass through each pit location. Plate 1 shows the locations of the diversion ditches required to route these drainages around each pit area and Figure 1 shows the tributary areas.

Ditch geometry was developed by Chemgold based on a number of regulatory requirements. The geometry of the low flow portion of each channel is based on the requirement that new cross sections approximate those of the natural channels bypassed. The primary purpose of this study is to verify that the selected cross sections are adequate to contain the peak discharge generated by the 100 year-24 hour event.

Hydrologic Analyses

Analyses were performed using the "SCSHYDRO" computer program. This program uses the same methodology as the TR-20 program developed by the Soil Conservation Service. All analyses were performed using the SCS Type II rainfall distribution. The following documents the basis for the program input values used.

Precipitation

The 100 year-24 hour rainfall depth was determined to be 4.8 inches based on geographic location and mean annual precipitation, using the method prescribed in California Department of Water Resources Bulletin 195. Mean annual precipitation was obtained from the Gold Rock Ranch station located approximately 7 miles southwest of the project site.

Basin Characteristics

Drainage areas were identified on the USGS 7.5 Minute Quadrangles "Quartz Peak" and "Hedges" (see Figure 1). Time of concentration was determined using Soil Conservation Service TR-55 methodology. An SCS Curve Number of 90 was used for all basins and is considered to be conservative. Basin characteristics are summarized in Table 1.

Table 1
Summary of Basin Characteristics

Basin	Drainage Area (Square Miles)	Time of Concentration (Hours)	SCS Curve Number
West Pit West Diversion	3.00	2.37	90
West Pit East Diversion	0.974	1.73	90
East Pit West Diversion[1]	1.30	2.08	90
Singer Pit Diversion	0.270	0.885	90
East Pit East Diversion	0.684	2.20	90

[1] Includes Singer Pit subarea.

Figures 2 through 6 present the detailed results of the analyses. Table 2 presents the peak flow rates obtained.

Table 2
Peak Flows in CFS

Event	West Pit West Diversion	West Pit East Diversion	East Pit West Diversion[1]	Singer Pit Diversion	East Pit East Diversion
100 Yr.-24 Hr.	2043	727	975	364	492

[1] Includes Singer Pit subarea.

Hydraulic Analyses

A computer program that utilizes Mannings equation was used to determine normal depth in each channel section at the peak flow rate. A Manning's roughness coefficient (n) of 0.035 was assumed for all sections. Channel slopes and normal depths are shown in Table 3. Typical cross sections are shown on Figure 7 and program output is shown on Figure 8. The freeboard indicated on Figure 8 is to the top of the 5 foot deep low flow channel. Actual freeboard is at least 5 feet higher when the broad upper bench section is considered. .

Table 3
Channel Slope and Normal Depth

	West Pit West Diversion	West Pit East Diversion	East Pit West Diversion	Singer Pit Diversion	East Pit East Diversion
Channel Slope	.0080	.0042	.002	.0056	.0045
Normal Depth	4.29'	3.54'	4.45'	2.18'	2.77'

FEMA Maps

The Flood Insurance Rate Map for the area indicates that the project is in Zone C (Areas of minimal flooding). A portion of the existing channel below the West Pit, West Diversion is designated Zone A (Areas of 100-year flood). This condition is not expected to affect the diversion channel hydraulics because the overall channel slope and geometry remain unchanged.

Transitions

Transitions from natural channels to diversion ditches will require the construction of embankments with underseepage cutoff. A typical transition plan and section view are shown on Figures 9 and 10. Cutoff and embankment specifications are as follows:

Slurry Wall and/or Cutoff Trench: Cutoff requirements will vary at the five locations depending on both the permeability and the relative hardness of the foundation materials encountered. After removing all alluvium from the embankment footprint, cutoff trenches will be excavated approximately 5 feet below stripped ground or to refusal with a dozer, whichever comes first. Backhoe pits will then be used to determine if a slurry trench will be beneficial or practical given the hard ground at the site. Slurry walls should be mixed in place and incorporate 3-4% bentonite by volume together with an equal amount of cement. Ready-mix concrete is an acceptable alternate.

Compacted Embankment: Compacted embankment should be constructed from select "impervious" fill with a maximum particle size of 6 inches and a minimum of 25% passing the #200 sieve when tested in accordance with ASTM D-422. This material will be placed in horizontal lifts with a maximum thickness of 8 inches and compacted to at least 92% of maximum dry density as determined by ASTM D-1557.

Slope Protection

Slope protection for waterside fill slopes, transitions and other potentially erodible areas will consist of a minimum of 18 inches of 6 inch by 12 inch riprap. A 6 inch minus backing layer will also be required where rock is placed on fine grained material. Both of these rock products can be produced on-site. With the exception of the transition fills, actual locations for placement of slope protection will have to be identified during construction.

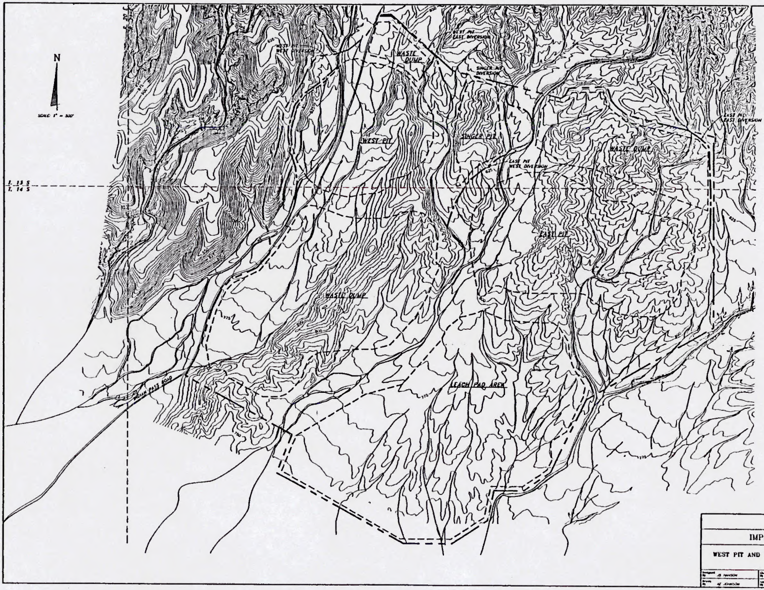
Six inch by 12 inch riprap is roughly equivalent to CalTrans "Facing" class slope protection. Table 873.3B in the CalTrans Highway Design Manual indicates a 1.8 foot thickness of "Facing" for parallel or impingement velocities up to 8 feet per second. The velocities shown in Table 4 indicate that the 6 inch by 12 inch riprap is suitable for all locations with the exception of the West Pit, West Diversion, in the case of impingement flow. The transition fill at this location will have to be armored with either 12 inch by 24 inch riprap (CalTrans 1/4 Ton Class) or grouted 6 inch by 12 inch riprap.

Table 4
Channel Velocities in Feet/Sec.

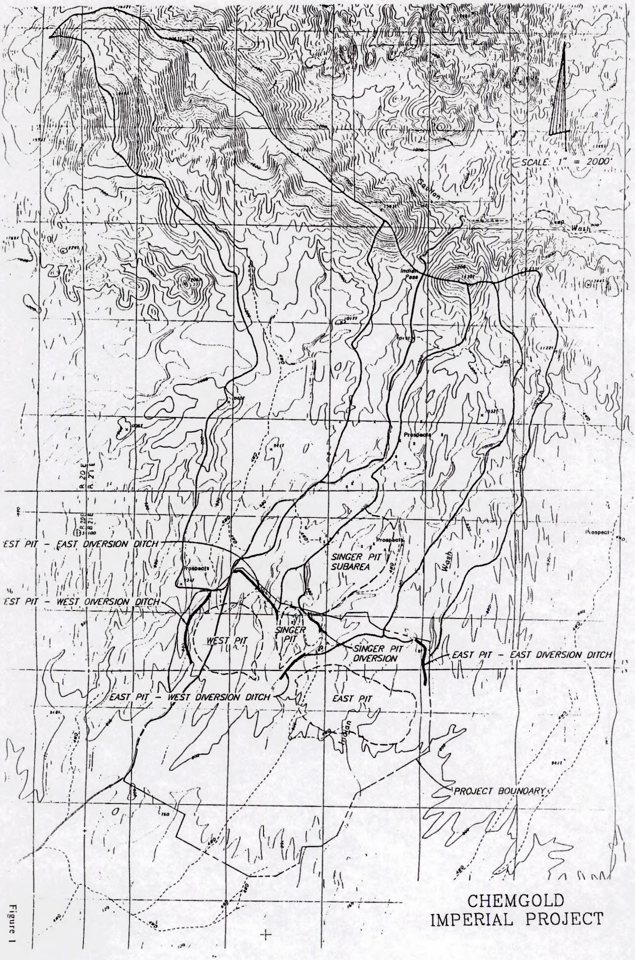
	West Pit West Diversion	West Pit East Diversion	East Pit West Diversion	Singer Pit Diversion	East Pit East Diversion
Normal Velocity	8.9	5.6	4.5	4.9	5
Bank Velocity Parallel Flow[1]	6	4	3	3.5	3.5
Bank Velocity Impingement Flow[2]	12	8	6	7	7

[1] CalTrans V_A [2] CalTrans V_B

Plate 1



CHEMGOLD		
IMPERIAL PROJECT		
WEST PIT AND EAST PIT DIVERSION OITCHES PLAN		
Designed By JS HANSON	Checked By JS HANSON	Date MAY 30 1997
Drawn By AE JOHNSON	Approved By JS HANSON	Sheet PLATE 1



CHEMGOLD
IMPERIAL PROJECT

Figure 1

Figure 2

Hydrologic Analysis
West Pit - West Diversion

The information otherwise contained in this
Appendix/Attachment has been removed from this version of the
Environmental Impact Statement (EIS)/Environmental Impact Report (EIR)

The removed information can be viewed in its entirety at the
Bureau of Land Management
El Centro Resource Area Office

Figure 3

Hydrologic Analysis
West Pit - East Diversion

The information otherwise contained in this
Appendix/Attachment has been removed from this version of the
Environmental Impact Statement (EIS)/Environmental Impact Report (EIR)

The removed information can be viewed in its entirety at the
Bureau of Land Management
El Centro Resource Area Office

Figure 4

Hydrologic Analysis
East Pit - West Diversion

The information otherwise contained in this
Appendix/Attachment has been removed from this version of the
Environmental Impact Statement (EIS)/Environmental Impact Report (EIR)

The removed information can be viewed in its entirety at the
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El Centro Resource Area Office

Figure 5

Hydrologic Analysis
Singer Pit Diversion

The information otherwise contained in this
Appendix/Attachment has been removed from this version of the
Environmental Impact Statement (EIS)/Environmental Impact Report (EIR)

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El Centro Resource Area Office

Figure 6

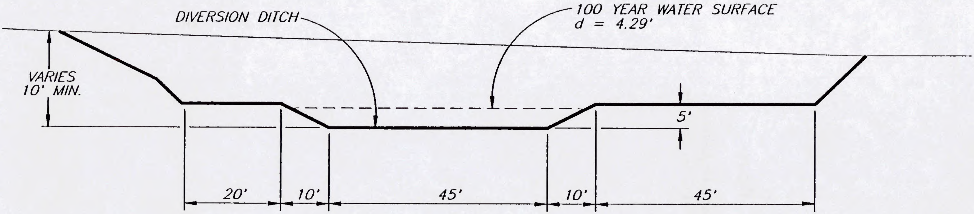
Hydrologic Analysis
East Pit - East Diversion

The information otherwise contained in this
Appendix/Attachment has been removed from this version of the
Environmental Impact Statement (EIS)/Environmental Impact Report (EIR)

The removed information can be viewed in its entirety at the
Bureau of Land Management
El Centro Resource Area Office

Figure 7

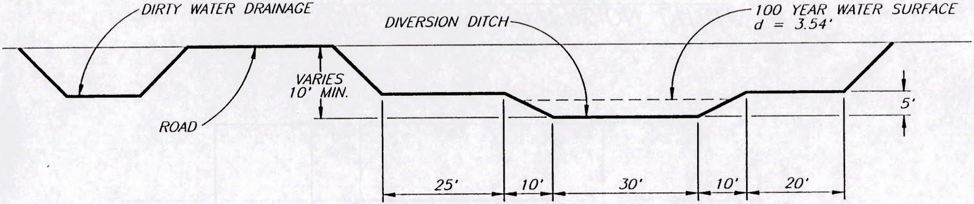
Hydraulic Analyses
Typical Cross Sections



WEST PIT – WEST DIVERSION DITCH

SCALE: 1" = 20'

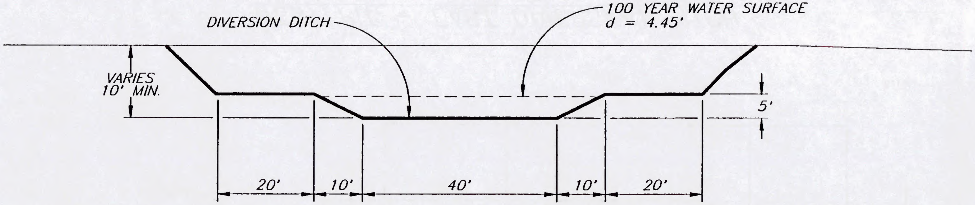
CHEMGOLD
IMPERIAL PROJECT



WEST PIT – EAST DIVERSION DITCH

SCALE: 1" = 20'

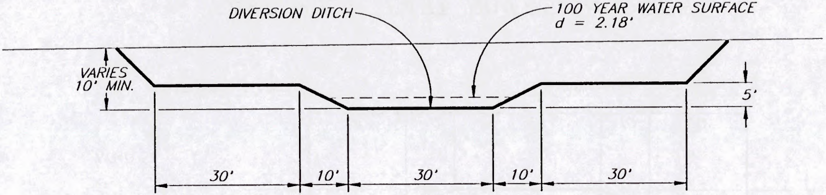
CHEMGOLD
IMPERIAL PROJECT



EAST PIT – WEST DIVERSION DITCH

SCALE: 1" = 20'

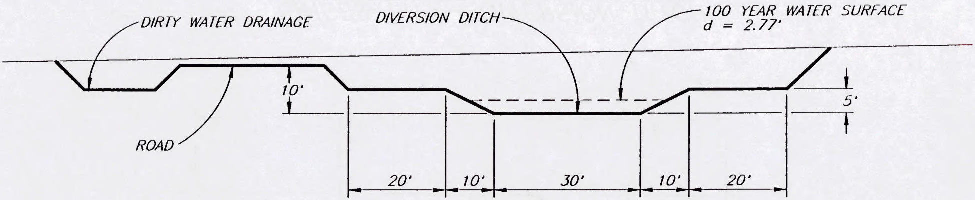
CHEMGOLD
IMPERIAL PROJECT



SINGER PIT – DIVERSION DITCH

SCALE: 1" = 20'

CHEMGOLD
IMPERIAL PROJECT



EAST PIT – EAST DIVERSION DITCH

SCALE: 1" = 20'

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Figure 8

Hydraulic Analyses
Program Output

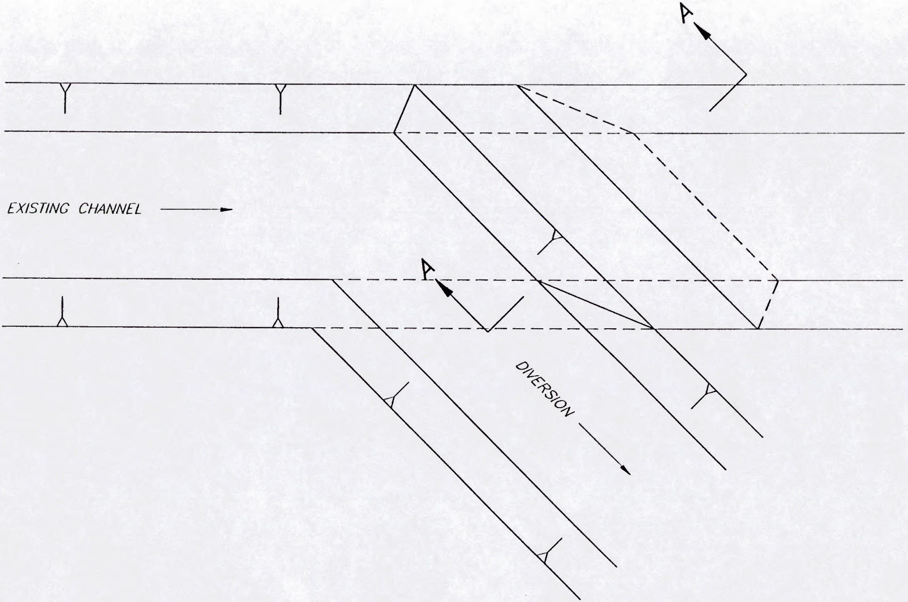
```
*******************************     SECTION     *******************************
*******************************   Version 4.12  *******************************
*****************   COMPUTER-AIDED HYDROLOGY & HYDRAULICS   *****************
```

PROJECT: Chemgold - Imperial Project - West Pit and East Pit Diversion Ditches
User: HANSON ENGINEERING
Date: 05/30/1997 Friday
Time: 14:22:19
Output: IMP5.OUT

Q cfs	SIDE SLOPE LEFT h/v	SIDE SLOPE RIGHT h/v	BOTTOM WIDTH ft	BOTTOM SLOPE ft/ft	n dim	CRITICAL / NORMAL FLOW DEPTH ft	CRITICAL / NORMAL FLOW VELOCITY fps	CRITICAL / NORMAL FLOW AREA sf	CRITICAL / NORMAL FROUDE NUMBER dim	FREE-BOARD ft	TOP WIDTH @ FRBD ft
West Pit - West Diversion											
2043	2.00	2.00	45.00	.0080	.0350	3.77	10.31	198.2	1.000	.71	65.00
						4.29	8.89	229.8	.815		
West Pit - East Diversion											
727.0	2.00	2.00	30.00	.0042	.0350	2.48	8.37	86.87	1.000	1.46	50.00
						3.54	5.55	131.1	.567		
East Pit - West Diversion											
975.0	2.00	2.00	40.00	.0020	.0350	2.53	8.56	113.9	1.000	.55	60.00
						4.45	4.48	217.4	.407		
East Pit - East Diversion											
492.0	2.00	2.00	30.00	.0045	.0350	1.94	7.49	65.72	1.000	2.23	50.00
						2.77	5.00	98.48	.569		
Singer Pit Diversion											
364.0	2.00	2.00	30.00	.0056	.0350	1.60	6.85	53.11	1.000	2.82	50.00
						2.18	4.85	75.03	.614		

Figure 9

Transition - Plan



TRANSITION FILL - PLAN
SCALE: 1" = 20'

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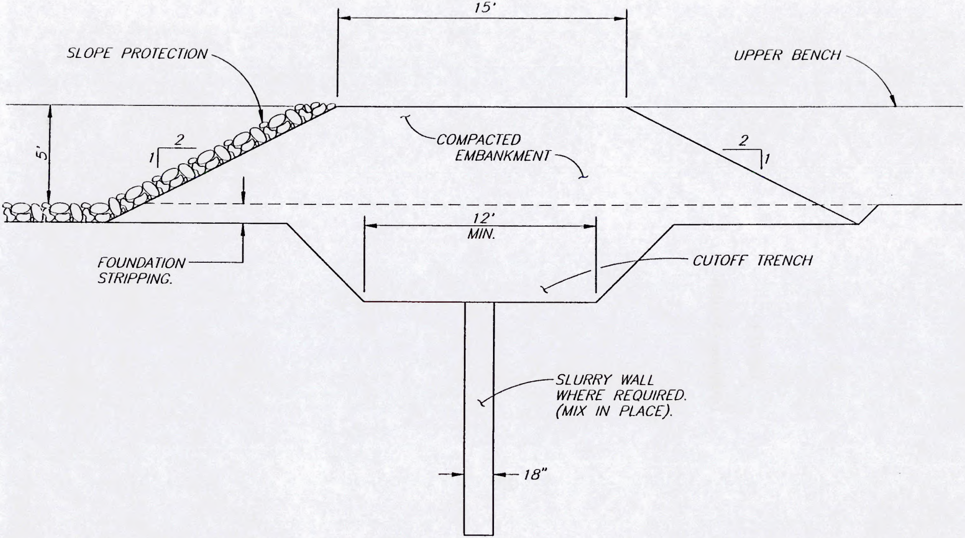
IMPERIAL PROJECT

Figure 10

Transition - Section



TRANSITION FILL – SECTION A–A

SCALE: 1" = 5'

CHEMGOLD
IMPERIAL PROJECT

ATTACHMENT E

SOIL RESOURCE EVALUATION FOR IMPERIAL PROJECT

SOIL RESOURCE EVALUATION

FOR

IMPERIAL PROJECT

Prepared for:

Chemgold, Inc., Imperial Project
1891 Rail Avenue
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Prepared by:

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Aurora, Colorado 80016

August 1995

1.0 INTRODUCTION

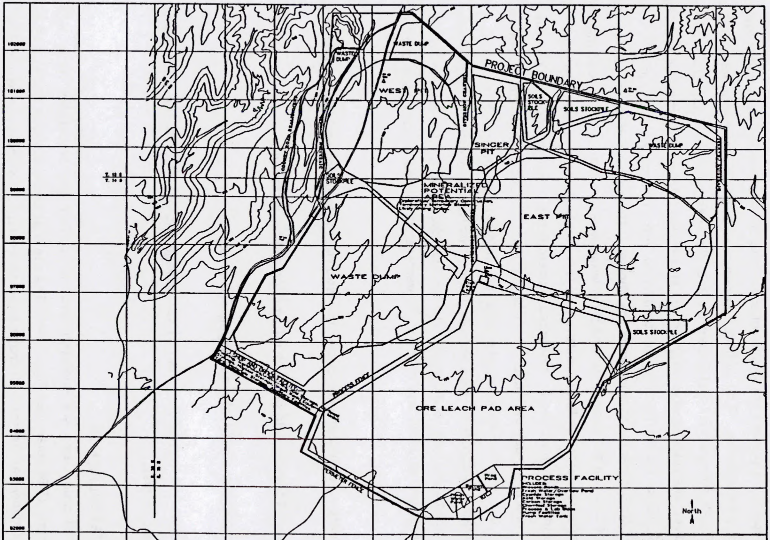
In this report, we present the results of a baseline soil analysis for the Imperial Project for Chemgold, Incorporated. This project is a proposed gold mine located in Imperial County, California, 45 miles northeast of El Centro and 5 miles west of Ogilby Road. Our work to date has involved intensive surveys on the study area during a field trip to the site from May 30 to June 3, 1995. During this time, we coordinated with Chemgold and their other contractors, designed the program, and conducted the surveys. The purpose of these surveys was to document baseline soil conditions, and provide baseline information on soils at the Imperial Project as a resource for future reclamation.This baseline report presents background and technical information on the soil resources with emphasis on soil for reclamation. Our study was designed to provide information in sufficient detail to support state and federal environmental review and permitting requirements, and to determine impacts of proposed actions. The qualitative descriptions include soils pattern analysis and mapping, occurrence, and relationship to topography and climate. The technical descriptions we present include soil unit descriptions, and physical and chemical characteristics related to soils as a plant growth medium.

The soils data we collected will provide information for the following activities or requirements:

- support the EIS with baseline information and for permitting,
- support and supply information for reclamation planning, and
- provide information for potential soil salvage and use as growth medium for native plant species.

2.0 SITE DESCRIPTION

The general study area we surveyed was the project site boundaries for a total of approximately 1565 acres (see Figure 2-1). The site is at an elevation of 750 to 875 feet in a broad relatively flat dissected drainage basin southeast of the Chocolate Mountains. The landform is a type of dissected old river alluvial or piedmont slope deposits that forms upland



IMPERIAL PROJECT

FIGURE 2-1

PROJECT SITE

Date Dec. 8 1994	Drawing No. IMP95.gcd
Scale 1 in. = 2000 Ft.	Revision: 5/12/95

flats and slopes interspersed with broad or narrowly incised washes. The underlying rock substrate is old consolidated and cemented alluvium, deposited as long as 10 million years ago. Drainage is to the southwest in a series of well defined dry watercourses (washes) from the Indian Pass crest to the northeast of the project to the Algodones Dunes in the southwest. Topographically, the area is characterized by low upland hills and flats with desert pavement surfaces interspersed with narrow dry washes.

There were no springs, seeps, or permanently wet areas or wetlands. The washes flow only after storms, otherwise they are dry. Water pools for a short time after rains in depressions in the sandy gravelly washes. There were also no hydric or wet soils found in the area. The average annual precipitation recorded the past 10 years in the vicinity of the site was 4.46 inches (Westec, 1994). During the winter/spring season of 1995, the weather was wetter than average with significant rains, and on occasion, the washes would flow for short periods of time.

Geologically, the project site is composed of a small area of rock outcrop of altered Jurassic granitic gneisses in the north-central portion of the site. Surrounding this outcrop are deep deposits of cemented alluvium that form the remainder of the surface rock substrate. Overlying this cemented alluvium is a broken discontinuous layer of basaltic cobbles and boulders from an eroded igneous outflow. Narrow bands of sand and silt material accumulate in shallow washes and underneath shrubs.

At the present time, the majority of the project site is subjected to very slow erosional deflation by wind and water. There are lag gravel surfaces on the flats and uplands with a thin to non-existent residual soil layer overlying the cemented alluvium. These old erosional deflation surfaces are covered with gravel and boulders that have turned black due to oxidation of the rock minerals by the intense sunlight and heat, these surfaces on the rocks are referred to as desert varnish. The light and heat also bakes the soil surface around the rocks which forms a water impenetrable surface and, together with the varnished rocks, is referred to desert pavement. Shallow wash bottoms accumulate soil material up to a foot and a half deep. The larger more active washes have a thin to deep veneer of recently deposited gravelly rock in the wash bottoms and fine sand along the sides. This erosional material

moves through the site by the flushing action of water flow following infrequent storm events. The weather patterns the last three years have been a wet cycle with periods of heavy rainfall that have produced runoff. Channels are deeply incised in the washes, indicating continued water erosion and sediment outflow. The present rate of these geomophological processes is slow due to the arid climate, and the rate was more presumably more rapid in the past under a different climatic regime at the end of the Pleistocene and fluctuations since.

The areas surrounding the project site are low mountain ranges; the Chocolate Mountains to the northwest, Cargo Muchacho Mountains to the southeast, Picacho Peak and Indian Pass to the north and east, and open to the southwest. The large drainage area that crosses the site is from the Indian Pass area to the northeast. Figures 2-2 and 2-3 are photographs of the Imperial Project showing a typical large wash with a gravelly bottom, and the uplands with a residual rock cover underlain with desert pavement.

3.0 METHODS

We reviewed previous information on soils on the study area and found little published material. The soils in this part of Imperial County have not been mapped by the U.S. Soil Conservation Service, and no published information is available on soils in the immediate vicinity of the project site. No surveys by the U.S. Soil Conservation Service are planned in the near future, since there is no economic or agricultural value to the soils. Agricultural areas to the east in eastern Imperial County and adjacent Yuma County in Arizona have a completed and published soil survey (SCS 1980) in a region of the Sonoran Desert with similar soils and climate. This soil survey provided some basis for the information on soil types and characteristics in this report. Two previous studies on the soil resources in the adjacent Cargo Muchacho Mountains for previous mining projects have been conducted, and some information from reports and the EA/EIR (BLM, 1988, and 1994) for these projects were also used in our preparation of this report.

We surveyed soils by conducting a thorough reconnaissance over the entire site for the general patterns and mapping units. We then described the soils by digging test holes in several soil types, and by concurrently examining backhoe soil pits dug in connection with geotechnical testing of soils by Westec. We collected soil samples from soil holes and test

Figure 2-2 View of the extensive uplands with residual igneous rock fragments, Imperial Project, June 1995

Figure 2-3 View of a typical large wash, Imperial Project, June 1995

pits for later laboratory analysis. Details of the procedures are given below.

3.1 Soil Survey Methods

We surveyed, classified, and mapped soils in the Imperial Project area from on site observations aided by the use of topographic maps and stereo pairs of aerial photographs. We then described soils from both deep test pits (to 10 feet), and from surface dug soil holes (up to 2 feet). We collected samples into cloth bags from depths where we observed obvious changes in soil profile characteristics. We observed and surveyed the study area for general conditions affecting soils during our initial surveys. These surveys were conducted on foot, or by vehicle on accessible roads using base maps and stereo pairs of aerial photographs. We observed the geologic, topographic, geomorphologic, and vegetative features in relationship to soils present. We based the general soil descriptive and mapping units on the similarities in soil properties; principally on depths, textures, and weathering of substrate and rock conditions. Secondary consideration for the units were based on topographic considerations of slope, temperature, and moisture regime in drainage patterns. General boundaries of the soil units were first determined in the field using aerial photography, and then refined based on obvious changes in topography and rock or soil substrate types observed in the general mapping.

3.2 Soil Units and Mapping

For the soil resources study in the National Cooperative Soil Survey's manuals provided standard procedures. For soil descriptions, we used the revised Soil Survey Manual (Soil Survey Staff 1993); and for classification of soils we referred to the USDA methodology in Keys to Soil Taxonomy, Sixth Edition (Soil Survey Staff, 1994). General and detailed information on the soils we obtained during the field visit and the subsequent analysis of soil samples. James Nyenhuis (personal communication 1995), certified soil scientist, provided assistance in the naming and classification of soil units.

We mapped similar soils as units and described them according to their parent material, topography, and soil profile developmental characteristics. The suitability of soils for specific uses (such as salvage and reclamation) were related to the soil properties of composition, texture, and chemical and physical properties. For this report, we adapted the soil descriptive

methods for identifying specific uses for soils as a resource, and than described soils in terms of resource potential and possible subsequent reclamation use.

The soil unit, a type or kind of soil sharing the same general properties, was the basic unit we used for describing and mapping purposes. The soil mapping unit itself was usually made up of one type, but some mapping units were complexes of soil types, mostly soil series. Included in the mapping were other types of units not necessarily related to soils (such as rock outcrop and mixed substrates). The soil classification and mapping unit descriptions are discussed in detail in Section 4.0.

3.3 Soil Profiles and Sampling

We examined soil profiles for the more common soil types in the project area and recorded descriptions on field forms. We based the soil profile locations using the reconnaissance mapping to ensure that the soil types were adequately reviewed and characterized. The profiles were examined either in deep backhoe pits or in shallow hand-dug soil pits. Some profile descriptions were taken in backhoe test pits dug for the geotechnical investigations in the footprint areas. We recorded the information for each profile, including location, topographic position, and the physical characteristics of each horizon.

We collected soil samples for laboratory analysis to determine physical and chemical characteristics. Properties measured in our home office were pH, conductivity, color, and reaction to dilute hydrochloric acid (effervescence). An analytical laboratory analyzed the soil samples for common properties important for plant growth. These tests determined if the soils would be suitable as plant growth media, or be capable of sustaining other uses during reclamation (such as erosion control).

4.0 SOIL RESOURCE DESCRIPTION

Soils on the project study area are typical for this desert region, and consist of shallow to very shallow gravelly sand with a large percentage of rock fragments. In this section we describe the soil resources for types, areal extent, conditions, and possibility for use during reclamation as a plant growth medium. We describe the soils properties that affect the salvage and use of soil in reclamation.

4.1 General Soils Description

The soils formed in the hot, arid climate in the Sonoran Desert region of southeast California with about 4.5 inches of annual rainfall. The hot, dry climate controls and restricts soil development, and high summer temperatures oxidize organic matter in the summer. However, old undisturbed surfaces persist that formed under different climatic regimes including a cooler, wetter period at the end of the last glacial period (10,000 years ago) and later climatic cycles. Soil formation has been extremely slow to non-existent during the past 10,000 years due , in part, to the rocky alluvial or rock outcrop substrates and desert climate. The old desert pavement surfaces are described in detail in the map unit descriptions in Section 4.3.

The soils formed from old cemented gravelly alluvium with some recent loose gravelly and sandy alluvium deposited in and along washes. The cemented alluvium, which formerly had a cap of basaltic flow, has formed mostly by physical weathering with some chemical changes on the old desert pavement areas. The surfaces of these pavement areas are somewhat to highly saline due to residual salt accumulations. The cementing materials of the alluvium are both calcareous and iron compounds which, in places, resemble a duripan or calcic horizon. This cementation, however, is more related to geologic processes of secondary mineralization. Depth to the alluvial bedrock varies from the surface to about 2 feet. Soil on the gneiss outcrop are residual and shallow with little chemical weathering.

4.2 Geologic, Topographic, and Geomorphologic Relationships

The majority of soils on the site were developed in mechanically weathered cemented alluvium on broad flats along drainages, and on gently slopes and uplands between drainages. The extensive desert pavement areas on the project site developed on the stable slopes and broad flats between the drainages. The age of these desert pavement surfaces vary extending from the end of the Pleistocene, about 10,000 years, to an estimated 1000 years ago. During the past 10,000 years and continuing to the present, slow deflation by wind and water and slow soil-forming processes in the cemented alluvium substrate have resulted in shallow skeletal soils on old stable surfaces, which include the desert pavement.

Recent shallow alluvium deposits in the channels of broad washes have little soil development and consist of rock and gravelly, partially sorted, sands that are frequently moved. The

shallow subsidiary washes are narrow bands that have some soil accumulated by water erosion and eolian deposits by wind. These cover little of the project site. Broad flats along larger washes have some thin deposits of recent alluvium, but mostly have shallow soils over the old cemented alluvium.

The gneiss rock outcrop form low dissected hills that are only weathered rock with some shallow residual soil in depressions and adjacent drainages. These outcrop areas are limited in extent, and are surrounded by old alluvium without topographic breaks.

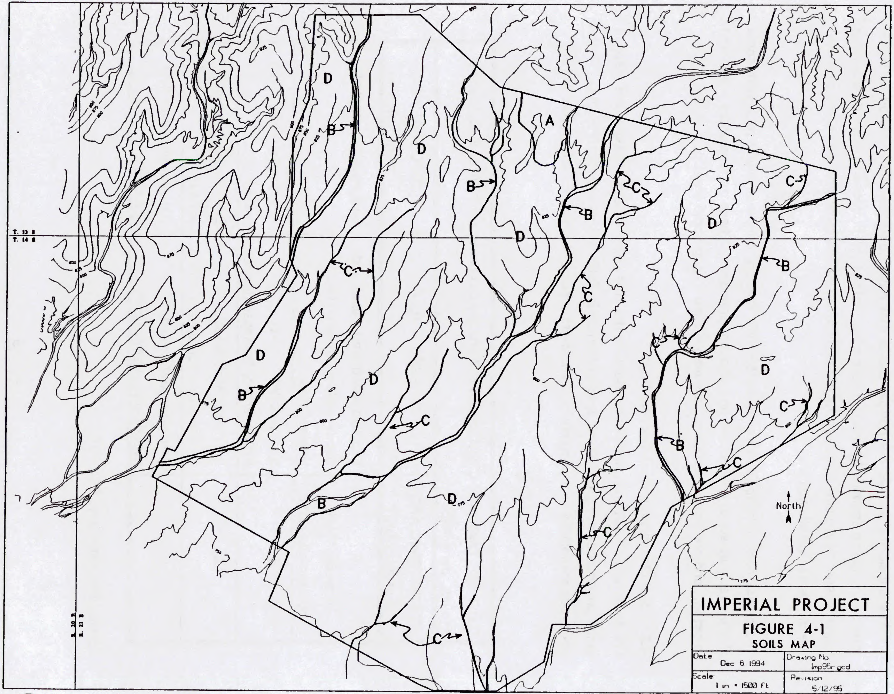
4.3 Soil Classification and Mapping Units

We determined 4 soil units or classifications on the study site. These soil types are mapped in the project area in Figure 4-1and are summarized in Table 4-1 as units A through D. These soil types are related to topography and substrate types as identified in the table. Where

Table 4-1 Taxonomic Classification of Naturally Occurring Study Area Soil, Imperial Project, June 1995

TAXONOMIC AND MAPPING UNIT	CLASSIFICATION	TOPOGRAPHIC POSITION
A (Laprosa/Rock outcrop complex)	Exposed weathered gneiss and Sandy-skeletal, mixed, lithic Haplocalcids	Low ridges, dissected
B	Sandy-skeletal, mixed hyperthermic, Torriopsamments	Recent alluvial fans and washes
C	Sandy-skeletal, mixed, hyperthermic Torriopsamments	Shallow washes along drainages
D	Sandy-skeletal, mixed, hyperthermic Petrocalcids	Old alluvial upland flats and slopes

Source: Present study, SCS 1980



IMPERIAL PROJECT

FIGURE 4-1
SOILS MAP

Date Dec 6 1994	Drawing No Imp95r.gcd
Scale 1 in = 1500 ft	Revision 5/12/95

possible we assigned the soil units to the taxonomic units described in the soil survey for the Yuma-Welleton area (SCS, 1980). Portions of the soils on the project site are a mosaic (complex) of these types, rather than continuous units or bands. The scale at which we mapped the site did not allow us to identify each change in soil type, so these mapping units are natural groupings of one or more soil units or series.

We present the map unit descriptions in the following paragraphs. Description of each unit include location and topographic position, soil series in the unit, depths, and textural characteristics affecting use and limitations of the soils for reclamation.

Map Unit A

This complex is limited in extent covering about 15 acres. It developed on rock outcrops on dissected low ridges and uplands in the north-central portion of the site. This complex is comparable to the Laprosa-Rock outcrop unit described in the soil survey (SCS,1980). The slopes are from 5 to 15%. Rock outcrops are frequent. Depth to bedrock is less than 20 inches. The texture is a very gravelly loamy sand with a high percentage of pebbles and cobbles (see photograph in Figure 4-2). Salvage and use of these soils for reclamation is severely limited, and salvage of this map unit is not recommended. This is due to the non-existent to shallow soil depths, the large percentage of rock fragments, and the difficulty in removing the soil because of the dissected slopes and small extent of deeper soil units.

Map Unit B

These soils formed in a complex mix of alluvium in major washes and recently deposited alluvial outwash materials in drainages. These soils occur on 46 acres of the project site. Soil depths are less than 20 inches, discontinuous, and may be sorted by flooding in the washes or fans (see photograph in Figure 4-3). The texture is a very gravelly sand and fine sand and is well drained. These soils can be salvaged in about 50% of these map units and used for reclamation as a seed source. However, the gravelly, sandy texture and coarse fragments of these soils limit their use as a plant growth medium because they form a draughty substrate if placed over porous soils or rock fragments. A large portion of the area of this soil type will not be disturbed during mine development, but will be left as undisturbed drainages.

Figure 4-2 Rock outcrop of Soil Map Unit A, Imperial Project, June 1995

Figure 4-3 Gravelly soil in wash in Map Unit B, Imperial Project, June 1995

Map Unit C

These soils are narrow bands in shallow subsidiary drainages and washes formed in mixed, recent alluvial with some surface eolian deposits over cemented alluvium. These soils occur on about 17 acres of the project site. Soil depths vary from very shallow on the edges of the washes to 18-24 inches in the well vegetated bottoms of the washes. There is little profile development and lime content increases in nodules in the alluvial substrate. These soils are suitable as a plant growth medium. Salvage potential is limited due to their small, narrow extent and shallow depths. It is estimated that about 75% of the area of these soil can be salvaged, and there is a further limitation of the narrow and discontinuous nature of these soils. The areas of this soil unit which are too narrow for salvage by equipment will result in an additional loss of about 15%.

Map Unit D

This soil complex occurs on all the old, weathered piedmont alluvial flats, uplands and slopes between drainages of this dissected broad basin. It occurs on 1,487 acres (95%) of the project area. This soil is comparable to the Ligurta-Cristobal complex, but differ in the shallow depth of soil and the type of rock substrate. The soils are shallow to very shallow, and formed in cemented alluvium rather than recent unconsolidated alluvium. Surfaces of these soils are stable. The desert pavement soils consist of a surface of small varnished rock fragments and large basaltic stones and cobbles underlain by a saline vesicular subsoil (see photographs in Figures 4-4 and 4-5). Soil depth is usually less than 24 inches, and may be as shallow as 2 to 4 inches. These older, undisturbed piedmont surfaces have developed a characteristic type of soil with a rock/pebble surface underlain by vesicular and saline subsoils that is unique to the hot desert regions (they are referred to a desert pavement). Rocks surfaces are weathered into a desert varnish, a black or dark brown veneer of manganous and ferric oxides. Subsoils are indurated cemented mixed coarse alluvium that can be penetrated with a backhoe. Weathering of the soil extends up to 40 inches. Accumulation of calcium carbonate is evident as light colored loose nodules. These soils are limited as a growth medium or seed source for reclamation due to the strongly saline subsoil, alkali conditions, and the gravelly or bouldery textures. It is recommended that these soil not be salvaged except in conjunction with the narrow drainages (soil Unit C) in about 3% (45 acres) of the area.

Figure 4-4 Surface of Soil Map Unit D, gravelly desert pavement, Imperial Project, June 1995.

Figure 4-5 Subsoil and substrate under desert pavement in Map Unit D, Imperial Project, June 1995.

5.0 SOIL SALVAGE POTENTIAL AND SUITABILITY

The soils are described for the results of the chemical and physical analysis, and potential for salvage. The general suitability of the soils for reclamation purposes is presented, and the amounts of salvageable soil calculated.

5.1 Results of Field and Laboratory Analysis

We present sample characteristics in Table 5-1, and summarize the results of the soil sample analyses in Tables 5-2, 5-3 and 5-4. These tables present the results of the field and laboratory analysis of chemical and physical characteristics of interest for reclamation. The important characteristics for reclamation are the coarse textures, chemical factors such as alkalinity (high pH), high amounts of salts (sodium), low nutrient status, and some high values for some other chemicals (sulfur and boron).

The soils have coarse textures related to the rocky substrates, parent materials, and differing degrees of weathering. Most of the soils are a very gravelly to gravelly sand or fine sand with low amounts of silt, and very little clays. Also, most of the soils are skeletal, that is, more than 35% of the volume is larger than 2 millimeters, and has gravel, cobbles, and larger rock making up a significant portion of the soils.

The soil substrates on the site are mainly cemented alluvium with one area of rock outcrop. Soils on the project site derived from weathered gneiss bedrock and transported alluvium. The cemented in-place old alluvium is high in coarse fragments with up to 80% of the materials as boulders and cobbles. Small areas of fine sand are deposited by water along drainages, and a few soil pits had some wind deposited fine material on or in the first few inches of the surface and under shrubs. Much of this fine material was also saline or alkaline. The weathering processes in this dry climate do not break the soil into silt or clays. The other notable physical factor was the contrast in soil properties from the recent, partially sorted alluvium in the washes and low flats to the stable soil surfaces of the desert pavement underlain by old cemented alluvium.

The notable chemical characteristics of these soils is related to the high concentrations of several of the chemical factors. These chemical characteristics are derived from the parent

Table 5-1 Soil Sample Characteristics, Imperial Project, June 1995						
Sample #	Depth	Type Sample	Remarks	Color	Texture	Effer[1]
SP-1-1	0-8"	open wash	typical for open flats next to wash	7.5YR 6/2 pinkish gray	very coarse sand	3
SP-2-1	8-15"	wash soil	side slopes	7.5YR 5/4 brown	fine sand	1
SP-1-2	6-20"	weathered bedrock	gneiss outcrop N central study area	2.5YR 5/6 red	coarse sand	1
SP-1-1	0-8"	weathered gneiss	north central study area	7.5YR 6/2 pinkish gray	coarse sand	1
T-6-1	0-2" surface	recent wash soil	loose, sandy some eolian mix	7.5YR 5/4 brown	sand	1
T-6-2	2-24"	fine grain/weakly cemented	white nodules present	7.5YR 6/4 lt. brown	coarse sand	1
T-1-1	0-2" surface	alluvium/gravel pavement	layered, cemented	2.5YR 5/4 reddish brown	coarse sand	1
T-1-2	2-24"	deep cemented alluvium	cemented	2.5YR 5/4 reddish brown	coarse sand	2
T-3-1	0-2" surface	desert pavement	gravel surface/fine sand	7.5YR 5/4 brown	loamy sand	1

Table 5-1 Soil Sample Characteristics, Imperial Project, June 1995						
Sample #	Depth	Type Sample	Remarks	Color	Texture	Effer[1]
T-3-2	2-8"	subsurface/ desert pavement	slightly cemented	7.5YR 5/4 brown	coarse sand	1
T-5-1	0-12"	surface/desert pavement	above cemented layer	2.5YR 5/4 reddish brown	sandy Loam	1
T-5-2	12-36"	alluvium	heavily cemented	2.5YR 6/4 lt. reddish brown	cemented	2
T-10a-1	0-2" surface	desert pavement	edge of leach pad	7.5YR 6/4 lt. brown	coarse sand	1
T-10a-2	2-24"	cemented alluvium	edge of leach pad	7.5YR 5/4 brown	coarse sand	1

[1] Effervescence: 1 = very strong, 2 = strong, 3 = moderate

Source: Present Study, Bamberg Associates

Table 5-2 Soil Sample Chemical Characteristics, Imperial Project, June 1995							
Sample #	Sample ID	pH	EC[1]	CEC[2]	Lime	OM[3]	Na[4]
SW-1-1	wash 1	8.6	0.43	5.8	low	0.3	0.20
SP-2-1	wash 2	8.7	0.64	7.0	high	0.9	0.24
SP-1-1	gneiss surface	9.1	0.50	5.8	high	0.3	0.21
SP-1-2	gneiss subsurface	9.0	0.45	5.7	high	0.2	0.21
T-6-1	shallow wash surface	9.0	0.59	6.2	high	0.5	0.25
T-6-2	shallow wash subsurface	9.2	1.09	10.4	high	0.8	1.64
T-1-1	DP1 surface	8.5	7.33	6.5	high	0.6	3.49
T-1-2	DP1 subsurface	8.6	13.26	6.5	low	0.6	9.05
T-3-1	DP2 surface	9.0	0.78	10.8	high	1.0	0.56
T-3-2	DP2 subsurface	8.7	5.93	7.3	high	1.0	5.26
T-5-1	DP3 surface	8.2	13.33	11.7	high	1.4	9.05
T-5-2	DP3 subsurface	8.2	39.78	8.9	low	1.8	23.49
T-10a-1	DP4 surface	8.3	7.80	7.0	high	0.9	5.54
T-10a-2	DP4 subsurface	8.4	12.40	10.7	high	0.9	8.13

[1] EC = electrical conductivity in MMHOS/cm

[2] CEC = cation exchange capacity in MEQ/100g

[3] OM = organic matter in percent

[4] Na = sodium in MEQ/100g soil

Table 5-3 Soil Sample Nutrient Characteristics, Imperial Project, June 1995 (values in ppm)												
Sample #	Sample ID	N	P	K	Ca	Mg	S	B	Zn	Fe	Ma	Cu
SP-1-1	wash 1	8.7	6.3	177	1630	33	6.7	0.8	0.6	2.5	1.1	0.3
SP-2-1	wash 2	2.9	5.5	119	2260	124	6.8	1.0	0.5	2.4	2.0	0.4
SP-1-1	gneiss surface	2.2	5.1	94	1710	70	6.4	1.0	0.6	2.3	1.2	0.7
SP-1-2	gneiss subsurface	2.9	7.1	59	1740	61	4.3	0.8	0.5	2.0	1.7	0.3
T-6-1	shallow wash surface	3.3	7.1	132	2200	101	6.3	3.6	0.6	2.2	1.2	0.4
T-6-2	shallow wash subsurface	1.9	5.4	100	2560	158	7.3	10.7	0.5	2.4	1.6	0.4
T-1-1	DP1 surface	81.2	11.1	96	4020	124	216.7	6.5	0.4	1.8	0.8	0.4
T-1-2	DP1 subsurface	116.0	9.8	123	4690	173	229.4	9.8	0.5	2.2	1.6	0.3
T-3-1	DP2 surface	5.6	10.9	344	3300	289	12.8	1.8	0.6	2.0	1.2	0.5
T-3-2	DP2 subsurface	99.8	9.8	390	2150	85	22.2	2.5	0.5	1.6	0.8	0.4
T-5-1	DP3 surface	140.5	4.7	253	4090	301	379.4	1.0	0.5	1.5	0.8	0.5
T-5-2	DP3 subsurface	149.1	5.8	191	7990	371	500.6	6.9	0.9	3.3	1.3	0.4
T-10a-1	DP4 surface	137.5	12.8	282	2760	156	179.7	1.3	0.7	1.8	1.1	0.6
T-10a-2	DP4 subsurface	256.6	10.4	240	3110	153	164.7	9.2	1.3	2.3	1.0	0.5

materials, and to the processes that concentrate them. All the soils tested were basic at a pH range of 8.2 to 9.2, and high alkalinity in soils from the bedrock and alluvium in the shallow washes. Some alteration of the bedrock by hydrothermal activity may has occurred, and this is reflected in the soils with a high lime content. The old cemented alluvium substrates had high amounts of some chemicals in the substrate (lime, calcium as carbonates, sodium) that were further concentrated in the surface soils. The materials that were concentrated or occurred in parent materials in high concentrations were salts, sodium, boron and sulfur.

The organic matter content of the soils is very low and variable, a factor typical of desert soils. Organic matter is uniformly less one percent in most of the sample. However, nitrate nitrogen was anomalously high in the desert pavement soils, perhaps indicating a residual concentration from soil algal crusts or some unknown factor. The nutrient status is mostly low and variable in available nitrogen (N), phosphorus (P), and potassium (K) in the wash and bedrock soil samples, and high or adequate in the desert pavement soils. Boron, sulfur, and calcium content is high in some of the desert pavement soils. These high concentrations can cause plant growth problems in unadapted species.

In general, the physical and chemical characteristics of surface soils are severely limiting for plant growth. The most notable aspects of the soils are: 1) a coarse texture with a high content of large fragments; 2) low organic matter and available nutrients; 3) high salts and excess alkalinity; and 4) some surface soils have high concentrations of other chemical such as boron and nitrates. Another aspect of the soils is the highly variable characteristics between the different types of soils. The few areas of soil with good growth characteristics are narrow and widely separated. The plant growth on soils of the project site is limited to native, well-adapted species. The plant cover and densities are low, even for a desert climate.

5.2 Soil Handling and Salvage Potential

Most of the planned mine development area is on old desert pavement surfaces that are not suitable for salvage and use in reclamation. These soils generally have poorly developed profiles and old piedmont surfaces. There are a few sites in the area to be disturbed that have soils that can be salvaged and used for reclamation. These sites with salvageable soils are in the shallow washes and adjacent slopes.

There are several uses for soils that are salvageable in the area to be disturbed during mining. These are: 1) as a plant growth medium, 2) as plating for erosion control, and 3) as geotechnical foundation material for construction of planned facilities. Our report is concerned with the first use as a growth medium that will support plant growth in reclamation and revegetation. These soil materials generally comprise the surface horizons which contain materials suitable to support native plant species adapted to the local conditions. As we discussed in the map unit descriptions, soils developed on the upland desert pavement have limitations for salvage. These are both physical and chemical limitations of shallow, skeletal soils with large amounts of salts and coarse fragments in the surface and subsurface soils.

The physical and chemical characteristics of the soil such as texture, pH, soluble salts, and nutrients are generally not limiting for growth of native plant species. However, the general lack of soil development and suitable surface horizons are major limitations for soil salvage and potential reclamation use. The nutrient status in the soils located at or near the surface contained little organic matter, and varied in nutrients such as nitrogen, phosphorus, and potassium. The most severe limitation for revegetation, using native species, is the lack of soil moisture on recently disturbed materials. The sparse, uneven rainfall runs off or drains through the porous soil. Revegetation programs we recently performed at nearby mines, demonstrated that the surfaces of recontoured mine rock stockpiles or spent leach heaps work as well as a growth medium as the salvaged soils (Bamberg Associates, 1993, 1995). Our recent tests of reclamation to native species have been very successful. The native species are adapted to the skeletal, local soils and do not require amendments. We have found that the most important consideration for reclamation is surface stability, and soil surface contouring into water catchment basins for moisture retention.

Shallow wash soils on the project site have texture and nutrient levels that are suitable for use in revegetation to native desert plants. Salvage of these soils is limited by equipment access and small extent along narrow bands. The estimated amounts of soil materials that can be potentially salvaged are given in Table 5-4.

These volume amounts are estimated by multiplying the percentage of area in acres of each soil type that can be stripped times the average stripping depth, and converting to cubic yards

as a volume. The estimated volume of soil suitable for stripping is a total of 112,200 cubic yards . A detailed analysis of the amounts and depths of soil materials that can be salvaged should await detailed plans for the development of the chosen facility designs. At that time, the balance of salvaged soil materials can be calculated, and the storage or distribution can be determined and become part of the reclamation planning. Experience has also shown that an initial field determination of soil salvage and suitability at the time of construction may be necessary.

Table 5-4 Soil Survey Map Unit Salvage Descriptions, Imperial Project, Chemgold, Inc., July 1995

Map Unit	Average Salvage Depth (in.)	% of Unit Salvage-able	Acres Disturbed	Salvage Volume (yd^{3})	Soil Depths (in.)	Primary Salvage Limitations
A	0	0	15	0	0-20	rock outcrop, surface rubble
B	10	50	25	16,800	0-20	gravel texture, rock
C	20	65	15	26,200	18-24	shallow, narrow extent
D	12	3	1,430	69,200	0-24	salt content, mixed alluvium, rock
Total			1,485	112,200		

Source: Bamberg Associates 1995

5.3 Suggested Mitigation

Suitable soils on the project site will be stripped and stockpiles for later use in reclamation. Transported alluvial substrates in the washes are generally the best source of weathered materials for reclamation. At the time of construction and operations soils will be determined

for present conditions and suitability for use in a reclamation program, generally as a seed source. The amount and depth of this salvageable soil will be field determined at the start of construction and staked for stripping. Soil stockpiles have been located on the preliminary design plans that are adequate to handle the quantities of soils to be stripped. Because of a general lack of suitable surface soils, this program will be conducted at a minimal level. Our results of revegetation testing and reclamation programs at nearby mines will be used as a basis for the soil surface preparation and revegetation using native species from seed collected locally.

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ATTACHMENT F

STATEMENT OF ACCEPTANCE OF RESPONSIBILITY FOR RECLAMATION

STATEMENT OF RESPONSIBILITY

I, the undersigned, hereby agree to accept full responsibility for reclaiming all mined lands as described and submitted herein with any modifications requested by the County of Imperial as conditions of approval.

Signed this FOURTEENTH day

of JULY, 1997

Operator or Operator's Agent
GLAMIS IMPERIAL CORPORATION

This Statement of Notification was signed before me on July 14, 1997

by Steve Baumann.

Vivian R. Williams
Notary Public